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WORKING PLAN

FOR

THE TIRUNELVELI NORTH FOREST DIVISION

1st APRIL 1961 to 31st MARCH 1971

BY
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Working Plan Officer.

Under the Direction of the Chief Conservator of Forests,
Madras.

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PREFACE.

With the addition of considerable stretches of ex-Zamin and ex-Panchayat Forests between 1951 and 1955, the old Tirunelveli-*cum*-Ramanathapuram Forest Division became unwieldy. Added to this, the transfer in 1956 of three ranges from Kerala State due to the reorganization of States necessitated the forming of Tirunelveli North and Tirunelveli South Divisions in place of the original parent division. Consequently, the Working Plan written by Sri B. A. Cariappa for the parent division could not be used for the new divisions. Hence, the necessity to prepare a working plan arose and this may be regarded as the first working plan of the Tirunelveli North Division newly constituted on 1st February 1957.

For the first half of the tenure of this working plan division Sri S. A. Rahmatulla held charge as Working Plan Officer and when he left on promotion as Conservator of Forests, the writer of this working plan took charge as Working Plan Officer. The Working Plan Division was opened on 15th November 1958 and the Reconnaissance Report was submitted to the Chief Conservator of Forests in March 1959. The Working Plan conforms to the approved Reconnaissance Report; and the frequent guidance and advice from Sri C. A. R. Bhadran, Chief Conservator of Forests and Sri T. Jeyadev, Conservator of Forests have played a great part in writing this plan.

For field work, the Working Plan Officer was assisted by two Range Officers and six Foresters in the beginning; but from June 1959 only five Foresters were employed. Greater part of the field work in general was done by Sri L. V. Narasimhan; most of the maps were drawn by Foresters Sri S. Syed Ismail, Sri P. Jebadurai and Sri Stephen P. Chelliah; and bulk of the enumeration work was done by Foresters Sri S. Subramanian and Sri C. Pothilingaswamy.

The writer wishes to place on record his indebtedness to the staff who assisted him unreservedly.

The Working Plan Division was closed on 15th September 1960.

G. J. RAJASINGH,
Working Plan Officer, Tirunelveli North Division, Palayamcottah.

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REVISED WORKING PLAN FOR THE FORESTS OF THE TIRUNELVELI, NORTH DIVISION.

PART I.

Summary of facts on which the proposals are based.

CHAPTER I—THE TRACT DEALT WITH.

SECTION 1—*Name and situation.*

This Working Plan deals with the entire Tirunelveli North Forest Division, except the Singampatti ex-Estate Forest, which is already covered by the Tirunelveli South Working Plan; however, for convenience, this will be known as the Tirunelveli North Working Plan.

2. This Forest Division, consisting of Reserves, ex-Estate Forest and proposed Reserves, was constituted under G.O. No. 2987, Food and Agriculture, dated 12th December 1956, when a general reorganization of the State Forest divisions was taken up; and it consists of four Ranges, namely, Ambasamudram, Kuttalam, Shencottah and Sankarankoil. The forests of the division form a very compact block lying in the northern half of Tirunelveli district along its western and a part of northern boundaries, bounded in the north by Ramanathapuram district, in the south and east by Tirunelveli South Forest Division and in the west by Kerala State.

3. Almost the whole of the division is situated on the Western Ghats. The tract falls between North latitudes 8 degrees 31 feet 41 inches and 9 degrees 25 feet 11 inches and East longitudes 77 degrees 8 feet 53 inches and 77 degrees 52 feet 0 inch; and it lies within Ambasamudram, Tenkasi, Shencottah and Sankarankoil revenue taluks.

SECTION 2—CONFIGURATION OF THE GROUND.

4. Only a fraction of the division, like the Uthumalai ex-Estate forest and the ex-Panchayat forests covers the plains, while the rest of the forest area is hilly occupying the great stretches of the Western Ghats starting from the Sivagiri hills down southwards to the Singampatti forest. The main Ghat crest rises to about 5,000 feet on an average except for a break near the Shencottah gap at Achenkoil and Ariankavu passes, while the base extends to an average width of about five miles until they widen out at the southern end to 13½ miles, near Papanasam. The Ghats are further characterised by numerous folds and extensions engulfing small narrow valleys except for the one vast Mundanthorai plateau; one marked feature of the extensions is that they all just out of the main ghat in a south-easterly direction. The interior and higher reaches of the ghats are endowed with steep rocky masses, spurs and peaks with faces of varying aspects alternating with narrow deep valleys difficult to reach even; likewise the outer fringes when they merge with the plains do not also show gentle slopes except in places near Papanasam, Puliangudi, etc., which accounts for the good numbers of waterfalls in the division.

5. Elevation varies from 90 feet to 5,000 feet; however, some of the peaks reach over 6,000 feet. The most popular and best known is the Agasthayarmalai 6,125 feet, the fabled abode of Agasthyar Rishi, the legendary father of Tamil Language; actually this peak now lies a short distance beyond the State boundary as it was ceded to the then Travancore State in 1923; yet it has been climbed by many a forest officer and Hindu devotee since it offers a magnificent sight both to look at and look from its conical top. Close to this are Ainathalai Pothigai peak 5,991 feet and Nagapothigai 5,478 feet. Incidentally the entire ghats to the west of Papanasam are locally known as Pothigaimalai. The other important peaks are Kuttalam peak 5,271 feet, Chokkampatty hill peak 5,351 feet, Vadanur hill peak 5,715 feet and Sivagiri hill peak 5,749 feet. Most of these peaks are precipitous and very difficult to approach by themselves, but the climbing is made almost impossible by the strong winds sweeping over them.

6. *Drainage and River Systems.*—The whole area is traversed by a network of rivers and streams which generally serve as feeders to the reservoirs and the numerous irrigation tanks in the plains; the smaller streams and rivers are channelled directly into cultivated lands soon after they cross the limits of the forest boundaries. If there is one place where the entire agriculture and its irrigation system depends on he management of catchment areas one cannot cite a better example and it is a happy situation that all the catchment areas are in the safe hands of the ghat forests. In a dry district like this, almost all the river waters are utilised for irrigation and very little finds its way into the sea; the general direction of drainage is eastwards and south-eastwards, towards the plains. In general, the surface drainage is good though in some parts of the interior

ghats above the sholas the ground tends to be spongy owing to the high contents of clay and heavy rainfall. Likewise, in certain places of the Mundanthorai plateau semi-swampy conditions temporarily prevail during the monsoon. The important rivers of the division are :—

1. Deviar.
2. Rasinge Ar.
3. Kottamalaiar.
4. Kulirattiar.
5. Virusadikidaiar.
6. Palaiar.
7. Hanuman Nathi.
8. Karungalar.
9. Chittar.
10. Jambunathi.
11. Ramanathi.
12. Kalar-Karuniar.
13. Koraiar.
14. Servaiar.
15. Kariar.
16. Thambaraparni.
17. Manimuthar.

7. The Thambaraparni, the chief river of the division, with its tributaries drains an area of 1,750 square miles; owing to its extensive catchment area in the ghats it enjoys the benefit of both the monsoons. It is 75 miles long from its source at the Periyar Pothigai to its mouth in the Gulf of Mannar. Its chief tributaries in the hills are Peyar, Ullar, Kariar, Servaiar and Pambar; in the plains it is joined by the Manimuthar and its tributaries like Varattar and Kusanguliar. The other rivers joining the Thambaraparni are Varahanathi, Gatanathi, etc., draining the Papanasam reserve, and Chittar, the last affluent in the north, draining the Kuttalam hills descends rapidly in a succession of beautiful falls and joins the Thambaraparni at Sivalapperi after irrigating vast areas. Four miles from the mouth of the Thambaraparni is the village called Korkai; this is identified as the ancient port and centre of pearl fishing patronised by the Greeks during the Pandyan Rule, and mentioned by the unknown author of Periplus (A.D. 80) and by, Ptolemy (A.D. 130) as Kolkhoi. In the Tamil Puranas also Korkai is mentioned. Besides these, numerous archaeological finds have established Korkai as the ancient port of Kolkhoi; but it is no longer a port since the sea has receded and much of the area was silted up. A similar village at the mouth of the Thambaraparni, called Old Kayal, is identified as the town of *Cail* described by Marco Polo.

8. *Reservoir Projects*.—The division can take pride that it has two reservoir projects, one serving for irrigation and the other for irrigation as well as hydro-electric power. The scenic beauty of their surroundings, the engineering triumph of the works and the easy accessibility by excellent roads have made these forests and the places great picnic spots and to some extent tourist attractions. The small colonies of the project staff and regular bus service have added great charm and life to these places.

9. The Papanasam Hydel Project across the Thambaraparni Ar situated in the heart of Ambasamudram Range consists of two stages with a water spread of 2.24 square miles at the upper dam and of 0·35 square miles at the lower dam and connected by an excellent allweather metalled road and a regular bus service. The idea of a dam was conceived as early as in the eighteen thirties by Col.A.T Cotton; but after a series of lulls and active investigations it was reduced to actual execution and completed in 1947. There are good ferry services at the two reservoirs enabling one to take short cuts to the interior forests. The postal, medical and educational amenities provided to the project staff and extended to the forest subordinates have to be commended.

10. The Manimuthar project across the river Manimuthar is located at the place where the river enters the plains; and though it is a smaller project serving only the irrigation wants of the people, its value and importance cannot be under-estimated. With a water spread of three square miles, it is situated at the southern end of the Division.

11. *Sacred Spots*.—Within the limits of the division, with reference to the rivers and their waterfalls exist a number of sacred spots for the Hindu Faith. The beautiful Kuttalam falls of Chittar and the famous temple attached to them attract thousands of devotees from the south; similarly the falls below the lower camp at Papanasam and the Siva temple attached to it are very popular with pilgrims as a place to obtain pardon of one's sins. The Forest Department employs one watcher to help the Pilgrims at the Papanasam falls. The smaller falls above the Kuttalam Forest Rest House has recently been handed over to the local administration. Another sacred spot is Banathirtham very near the spot at which the Thambaraparni Ar enters the upper dam reservoir. (Hope Lake.)

12. Before the Papanasam Hydel Project was commissioned, the Harvey Mills situated at the foot hills of Papanasam produced their own electricity by channelling a part of the Tambaraparni waters into a small reservoir and through penstock pipes; even now the fittings can be seen in situ, but the tiny reservior now serves as a large swimming pool and a source of water to generate steam power.

SECTION 3—GEOLOGY, ROCK AND SOIL.

13. The district has been geologically surveyed.

14. In the ghat forests, the underlying rocks belong to the granitoid or gneissic series studded with numerous small puik garnets of inferior type. Veins of blacks mica and quartz are seldom displayed luxuriantly. Patches of a coarse conglomerate containing a high percentage of limestone can be found in the Sivasailam hills; effects of water flowing through these formations can be seen from the lime deposited in stream beds and the stalactites and stalagmites locally formed on a small scale. Rocky out crops occur througout and some of them as the Pandyankottai Malai and Kuttalam hills are examples of colossal size. Foliation is rare.

15. In the plains are admixture of quartz and quartizite is seen especially where the soil is reddish.

16. The soil shows no great differences in colour and texture, though variations in depth are common. Soil in the cultivated plains is the black cotton soil, while in the ghats it is a red soil varying according to local edaphic factors. Along the outer fringes where the rainfall is less and consequently weathering is also a slow process, the soil is often shallow and poor in humus contents, which fact is often manifested in the poor type of tree growth. In contrast with this, in the evergreen forests, where too the soil is shallow and poor with numerous rocky and boundary outcrops, the adverse factors are nullified by the heavy rainfall and rich collection of humus. In the undulating and gentle slopes often the soil is deeper and richer supporting the most valuable mixed moist deciduous forests. However, here and there the site displays a high proporton of clay and semi-swampy conditions.

17. Along most of the river banks are found small alluvial deposits. The soil is a sandy loam of pale red colour varying in depth according to the steepness width and relative position of the tributaries. Where the slope is gentle and the valley is broad the soil depth extends even to 16 feet and one comes across the best teak forests of the division, as in the valley above the lower dam water spread near Mundanthorai.

SECTION 4—CLIMATE.

18. On the plains and at the foot hills up to an elevation of 1,000 feet the climate is very hot and dry since the Western Ghats act as a strong barrier against the good influence of the south-west monsoon at a time when most needed. During the months of December January the weather becomes pleasant and cool; but it is severe cold in the plains. Frost is unknown. The higher localities above 1,500 feet enjoy a cool climate and it becomes delightful and pleasant as one goes higher up to the interior camps like Kannikatty.

19. The average mean temperature is 91° F. which during the summer months reaches over 100 °F.; being close to the equator, the district experiences a second summer also in the month of September. The hottest part of the year is March to May; with the break of the south-west monsoon on the hills the moist winds bring down the heat in June. The maximum benefit from this moderating influence is derived by places situated opposite the gaps in the hills, such as Sivasailam opposite the Sivasailam gap and Kuttalam-Shencottah environs opposite the Ariankavu pass. It is for this reason that Kuttalam has become one of the most popular health resorts of the State.

20. *Rainfall.*—Within the division itself the annual rainfall widely varies according to the places; in the plains it is lesser as one goes eastwards. The average annual rainfall available for reliable stations is given in Appendix-I. The average monthly rainfall for the various stations is given in the following statement as it will be helpful in timing the regeneration operations :—

Name of station. (1)	*January.* (2)	*February.* (3)	*March.* (4)	*April.* (5)	*May.* (6)	*June.* (7)
	Average rainfall in inches.					
			Ambasmudram Range.			
Kannikatti	11·04	4·00	2·66	4·79	12·25	24·45
Kaudaparai	9·12	2·77	2·18	5·32	12·22	23·10
Valayar	6·59	2·28	2·04	4·54	14·38	36·19
Kuduparai	1·18	0·80	0·50	0·68	5·23	8·25
Upper Dam	6·50	2·45	2·44	3·01	4·79	7·35
Mundanthorai	6·73	..	0·90	0·80	6·26	4·14
Lower Dam	5·45	3·13	1·90	2·93	2·49	2·09
Ambasamudram ..	3·35	1·08	2·08	2·88	1·84	0·81
Sivasailam	2·50	..	3·00	1·50	3·75	0·66
Kuttalam Kullaravi ..	3·03	2·23	2·05	1·97	5·50	12·83
			Kuttalam Range.			
Kuttalam	1·74	0·78	1·76	3·48	3·47	5·38
Kadayanallur ..	1·18	0·97	2·70	4·26	2·29	1·52
			Sankarankoil Range.			
Sivagiri	1·31	1·02	2·76	3·89	1·91	0·83
			Shencottah Range.			
Shencottah	1·39	0·41	2·35	3·20	4·39	7·08

	July. (8)	*August.* (9)	*September.* (10)	*October.* (11)	*November.* (12)	*December.* (13)	*Total.* (14)
	Average rainfall in inches—cont.						
			Ambasamudram Range—cont.				
Kannikatti	19·76	10·64	10·57	19·76	19.86	15·10	154·88
Kaudaparai	19·03	10·89	9·59	18·29	17·51	11·86	141·88
Valayar	32·19	21·93	14·04	20·06	14.21	9·05	177·35
Kuduparai	6·66	5·90	2·38	7·38	9.63	4·30	52·89
Upper Dam	5·68	2·34	3·03	9·96	14·62	7·72	69·89
Mundanthorai	2·32	1·13	0·93	0·92	5.74	4·13	42·10
Lower Dam	1·67	0·96	1·00	5·53	9.99	5·86	43.00
Ambasamudram ..	0·94	0·30	0·80	5·36	7.46	5·00	32·15
Sivasailam	3·23	4·50	0·25	3·83	5.00	2·38	31·55
Kuttalam kullaravi ..	10·18	10·74	4·80	9·10	12.50	5·35	80·28
			Kuttalam Range—cont.				
Kuttalam	5 14	4·10	2·90	5·49	8.01	3·44	46·19
Kadayanallur	1·27	0·34	1·59	5·23	9.68	2·46	33·49
			Sankarankoil Range—cont.				
Sivagiri	0.53	1·04	1·47	6·24	8.43	1·92	31·31
			Shencottah Range—cont.				
Shencottah	5.56	2·85	1·92	8·81	7.87	3·63	49·46

21. A comparison of the rainfall figures with those of 30 years ago confirms the local people's complaint that in recent years failure of rains has become common and the annual rainfall itself is less.

22. Effect of the south-west monsoon is felt chiefly in the interior ghats where it usually breaks in May-June and continues till August with varying periods of break. This is the principal monsoon for the ghats, the Mundanthorai plateau, Kuttalam and Shencottah areas; whereas on the Sivagiri hill and the plains this monsoon does not confer any benefit except to let down an occasional drizzle. The river Tambaraparni and its tributary, the Chittar, that have their head waters within the ghats derive

maximum benefit from this monsoon. Often, when the temperature records 95 F on a dry summer day in Palayamcottai, the Tambaraparni used to take the people in the plains by surprise with its flood waters brought from the south-west monsoon zone.

23. The North-east monsoon which is the principal monsoon for the tanks, and dry crops in the plains and for the foot hills, usually breaks in the middle of October and continues till the middle of December; but often it is erratic and unreliable; and the precipitation is so ill-distributed as to come down in a few rainy days causing floods or quick run off without allowing sufficient chance for the ground to absorb. This cycle of drought alternating with floods has managed to maintain the district economy at a precarious level. The record flood level was in 1923 when the water rose to 31 feet at the Tirunelveli bridge. The north-east monsoon is the planting time in the Sivagiri hills.

24. *Health.*—Generally all the places are healthy through few cases of malaria are come across now and then. Sivagiri hills and Vasudevanallur Reserved Forests are malarial with the result the tract is very unpopular with the labour population, who are reluctant to come and work for the department.

SECTION 5—WATER-SUPPLY.

25. The water-supply at various camps and subordinates' quarters is generally ample throughout the year; in the plains and near foot hills wherever there are wells the water is rather brakish, while in the ghat section the water is delightfully fresh and soft. The Tambaraparni and its canals meet the washing and drinking requirements of the people in the plains. Water scarcity during summer is not an uncommon feature in Nanguneri taluk.

SECTION 6—DISTRIBUTION AND AREA.

26. The total area of the forest division is 206,451·36 acres (322·58 square miles) inclusive of the ex-estate and ex-panchayat forests. The headquarters of the division is at Shencottah. The division consists of four ranges ass hown in the following table :—

Number and name of range. (1)	*Headquarters.* (2)	*Area in acres.* (3)	*Number of beats.* (4)
1 Ambasamudram	Ambasamudram	111,244·86	14
2 Kuttalam	Kadayanallur	37,820·70	15
3 Shencottah	Shencottah	9,852·00	6
4 Sankarankoil	Puliyangudi	47,533·80	10
	Total	206,451·36	45

27. Statement showing particulars of the forests covered by each range is given in the following table :—

Serial number and name of reserve, etc. (1)	*Area in acres.* (2)	*Number and date of section 16 notification.* (3)
Ambasamudram Range.		
1 Papanasam Ghat Forest Upper Slopes	63,838·85	11, dated 20th December 1883.
2 Papanasam Ghat Forest Lower Slopes	19,155·58	534, dated 27th November 1890.
3 Hill Enclosures of Upper and Lower Slopes	189·44	19, dated 20th December 1911.
4 Kaloli Enclosure	8·78	81, dated 31st January 1912.
5 Addition to Papanasam Reserve Lower Slopes, Vikramasingapuram village.	2·21	581, dated 28th November 1913.
6 Singampatti ex-Estate Forest three beats	20,050·00	
Total	111,244·86	

Serial number and name of reserve, etc. (1)	*Area in acres.* (2)	*Number and date of section 16 notification.* (3)
Kuttalam Range.		
1 Kuttalam Reserved Forest Upper Slopes	7,344·26	11, dated 20th December 1883.
2 Extension I to Kuttalam No. 3 and Lower Slopes	1,698·00	178, dated 10th April 1891.
3 Extension II to Kuttalam Reserved Forest No. 3 and Lower Slopes.	133·00	205, dated 21st May 1902.
4 Extension III to Kuttalam Reserved Forest No. 3 Lower slopes.	144·50	231, dated 5th May 1900.
5 Vasudeva Estate	162·00	165, dated 22nd March 1910.
6 Panchautangi Estate	71·80	532, dated 15th November 1911.
7 Old S. No. 1357, East of Ilanji	31·51	49, dated 17th January 1913.
8 Addition to Kuttalam Reserved Forest T. Parvatham Estate.	26·66	470, dated 6th October 1915.
9 Hope Estate	183·50	17, dated 9th January 1920.
10 Extension I—V to Kuttalam Reserved Forest	6·31	185, dated 22nd May 1933.
11 Vadagarai Melpidagai No. 3 (b)	435·20	178, dated 10th April 1891.
12 Vadagarai Melpidagai North A, South A and C	70·96	438, dated 27th September 1912.
13 Kadayanallur Reserved Forest Upper Slopes	5,036·80	11, dated 20th December 1883.
14 Chinnakadu Reserved Forest	1,388·80	248, dated 9th June 1880.
15 Kadayanallur Upper Slopes 3C-2, Lower Slopes	1,171·20	178, dated 10th April 1891.
16 Vadagarai Kilpidagai 3C-1	582·40	Do.
17 Alkondal Nelliyuthu and Shermalai	163·04	281, dated 7th June 1898.
18 Addition to Chinnakadu Reserved Forest	0·90	28, dated 15th December 1911.
19 Kadayanallur additions—9 small bits	33·12	53, dated 18th January 1912.
20 Krishnapuram Upper Slopes	3 654·40	11, dated 20th December 1883.
21 Krishnapuram Upper Slopes Extension	1,946·50	156 and 178, dated 14th March 1901 and 10th April 1891.
22 Krishnapuram Upper Slopes addition	12·42	473, dated 29th October 1912.
23 Kottamalai Reserve	883·20	304, dated 24th October 1889.
24 Kavalkattu Parambu	371·20	202, 24th dated October 1889.
25 Kotamalai addition	19·27	18, dated 21st December 1911.
26 Kottamalai Extension	137·61	529, dated 21st November 1912.
27 Mayamankurichi Reserved Lands	477·14	..
28 Chokkampatti Ex-Estate Forest	3,000·00	..
29 Vairavankulam Ex-Estate Forest	5,000·00	..
30 Uthumalai Ex-Estate Forest	3,472·00	..
31 Vellakalparambu Ex-Estate	112·00	..
32 Okkanindran Pothai Ex-Estate Forest	50·00	..
Total	37,820·70	
Shencottah Range.		
1 Puliyarai Reserved Forest	8,496·00	
2 Vellakal Teri Reserved Forest.	556·00	
3 Achenpudur Grazing Block R.L.	500·00	
Total	9,852·00	
Sankarankoil Range.		
1 Puliyangudi Chintamani Vasudevanallur Upper Slopes.	16,038·40	11, dated 20th December 1883
2 Puliyangudi Chintamani Vasudevanallur Lower Slopes.	10,490·00	176, dated 10th April 1891
3 Chintamani Blocks A and B	321·46	231, dated 19th May 1899
4 Narayanapuram Reserved Forest	390·31	193, dated 29th March 1911
5 Addition to Vasudevanallur Reserved Forest	18·29	414, dated 19th September 1912
6 Addition to Thirumalapuram	2·23	437, dated 22nd October 1912
7 Addition to Melapuliangudi	8·83	411, dated 19th September 1912
8 Addition to Melachintamani	6·21	439, dated 22nd October 1912
9 Addition to Narayanapuram	7·07	440, dated 22nd October 1912
10 Thirumalai Naicker Pudukudi Ex-estate Forest	1,986·00	....
11 Sivagiri Ex-Estate Forest	18,259·00	....
Total	47,533·80	

28. Statement showing the range wise distribution in acres of th different classes of forests in the division :—

Serial number and range.	*Reserved Forest.*	*Reserved Land.*	*Ex-Estate Forest.*	*Total.*
(1)	(2)	(3)	(4)	(5)
1 Ambasamudram	83,194.86	..	28,050·00	1,11,244·86
2 Kuttalam	25,709·56	477·14	11,634·00	37,820·70
3 Shencottah	9,352·00	500·00	..	9,852.00
4 Sankarankoil	27,288·80	..	20,245·00	47,533·80
Total	1,45,545·22	977·14	59,929·00	2,06,451·36

29. The names of the beats into which each range is divided are given in the statement below :—

Name of beats.	*Headquarters.*	*Staff.*
(1)	(2)	(3)
	Sankarankoil Range.	
1 T. N. Puthukudi	Puliangudi	Forest Guard and Watcher.
2 Puliangudi	Do.	Do.
3 Chinthamani	Do.	Do.
4 Karupasami Koil	Chellapuli	Do.
5 Vasudevanallur	Vasudevanallur	Do.
6 Narayanapuram	Chellapuli	Do.
7 Sivagiri-1	Sivagiri	Do.
8 Sivagiri-2	Do.	Do.
9 Sivagiri-3	Do.	Do.
10 Sivagiri-4	Do.	Do.
	Shencottah Range.	
1 Vellakaltheri	Parvathipuram	Two Forest Guards.
2 Mekkarai	Mekkarai	Do.
3 Puliyara	Puliyara	Forest Guard and Watcher.
4 Molagarachanparai	Poolankudieruppu	Two Forest Guards.
5 Kannupuli	Kannupuli	Do.
6 Thondi	Shencottah	Forest Guard.
	Kuttalam Range.	
1 Mathalamparai	Mathalamparai	Forest Guard and Watcher.
2 Aiyarperi	Kudieruppu	Do.
3 Kuttalam	Kuttalam	Do.
4 Vallam	Vallam	Do.
5 Vadagarai-Melapidagai	Pumbli	Do.
6 Vellakalparambu	Veeranam	Do.
7 Mayamankurichi	Alangulam	Do.
8 Sivalarkulam	Aiyanarkulam	Do.
9 Uthumalai West	Rukkumanyapuram.	Do.
10 Uthumalai East	Do.	Do.
11 Chinnakadu	Kasitharmam	Do.
12 Kadayanallur	Kadayanallur	Do.
13 Vairavankulam	Do.	Do.
14 Krishnapuram	Do.	Do.
15 Chokkampatti	Chokkampatti	Do.
	Ambasamudram Range.	
1 Kannikatty	Kannikatty	Forest Guard and Watcher.
2 Upper Dam	Upper Dam.	Do.
3 Mailar	Do.	Do.
4 Singampatti (Beat 3)	Manimuthar.	Do.
5 Singampatti (Beat 4)	Do.	Do.
6 Koiltheri	Mundanthorai	Do.
7 Patharmalai	Do.	Do.
8 Kodamadi	Kodamadi	Do.
9 Koraiar	Papanasam	Do.
10 Aladiyur	Do.	Do.
11 Ambur	Sivasailam	Do
12 Sivasailam	Do.	Do.
13 Govindaperi	Kadayam	Do.
14 Kadayam	Do.	Do.

SECTION 7—BOUNDARIES.

30. There is only one natural external boundary for the division and that is the inter-State boundary beetween Kerala and Madras States, starting from the base of Agasthiarmalai and running northwards touching the chief peaks, except for a short interruption near Shencottah.

In 1956 when Shencottah taluk was transferred to Madras State, the boundary between Kerala and Madras States was demarcated by a cleared line; since it runs along the ghat crest, it need not be cleared every year. The ntified area of Pulyara Reserved Forest according to Travancore Forest Act is 8,496 acres, but the outer boundary is vague at several places and the reserved forest itself is riddled with numerous patta lands rendering protection very difficult. Added, the Kerala Government has not handed over the settlement records so far to enable this State to fix the correct boundary. A list of the enclosures in Puliyara Reserved Forest is given in Appendix II.

31. The internal boundaries demarcating the estates in Kuttalam, Kadayanallur and Papanasam Reserved Forests are overgrown with bushes, rendering it difficult to verify them. The ex-estate forest boundaries also remain unsurveyed and undemarcated; now that this work is included in the Five-Year Plans, it is reasonable to except that survey and settlement of these vast areas will be completed some day.

32. The reserve boundaries separating the cultivated plains demarcated by cleared lines of 12 to 15 feet wide, stone cairns and pillars bearing tarrer serial numbers, arrow marks and the letter ' R.F. ' are maintained by the beat staff. Often the cairn numbers shown in the Survey of India sheets do not coincide with the numbers in the field.

33. There are some encroachments in the Mundanthorai plateau near the upper dam; eviction proceedings were taken against the offenders, but they have appealed to the High Court for assignment on grounds that they have spent large amounts to improve the site, etc. Till the High Court pronounces its judgment nothing can be done.

SECTION 8—LEGAL POSITION.

34. All the reserve forests are reserved under section 16 of the Madras Forest Act or under section 18 of the Travancore Forest Act; they are not cumbered with any rights of importance except with those admitted at the time of settlement for men and cattle by rights of way. There are two reserve lands, namely, the Mayamankurichi Reserve Land in Kuttalam Range and Achempudur Grazing Block Reserve Land in Shencottah range. There are two ex-panchayat forests, one of which is the Mayamankurichi Reserve Land (477.14 acres) and the other is Sivalarkulam Reserve Forest (1,411.28 acres); the later in turn is also known as Kottamalai Panchayat Reserve and divided into four bits, namely, Kottamalai Reserve Forest (882.20 acres), Kavalkattuparambu (371.20 acres), Kottamalai Additions (19.27 acres) and Kottamalai Extension (137.61 acres). Mayamankurichi Ex-Panchayat Forests was restored to the control of the Forest Department on 1st July 1952 and Sivalarkulam Ex-Panchayat Forest on 15th October 1951.

35. Consequent on the Estate Abolition Act, the ex-estate forests have become the property of Government, though not on a par with the reserved forests by reason of the rights and concessions being still in a fluid state; none of them, except the Singampatti Ex-Estate Forest, have been notified under section 26 of the Madras Forest Act since Government in their Memorandum No. 5836/C, IV-54 (Agriculture), dated 7th June 1954 have observed that it is unnecessary. The dates of taking over and their respective areas are given below :—

Name of ex-estate forest. (1)	*Area in acres.* (2)	*Date of taking over.* (3)	*Range.* (4)
1 Sivagiri	18,259	15th October 1951	Sankarankoil.
2 Uthumalai	3,472	Do.	Kuttalam.
3 Chokkampatti	3,000	Do.	Do.
4 Vairavankulam	5,000	Do.	Do.
5 Okkanindran Pothai ..	50	Do.	Do.
6 Vellakalparambu	112	Do.	Do.
7 T. N. Pudukudi	1,986	Do.	Sankarankoil.
8 Singampatti (part)	28,050	19th February 1952	Ambasamudram.

36. It must be noted that out of the total area of 56,100 acres of Singampatti ex-estate forest 733 acres by the Papanasam Project and 635 acres by the Manimuthar Project were submerged; this leaves 28,050 acres of forests in Tirunelveli North Forest Divsion and the remaining 26,682 acres of forest in Tirunelveli South Forest Division. The entire forest was notified under section 26 of the Madras Forest Act, in pages 482–483 of *Fort St. George Gazette*, dated 23rd March 1937.

SECTION 9—RIGHTS AND CONCESSIONS.

37. In the reserved forests the rights and concessions have been settled and defined, a full account of which can be found in the respective section 16 notification in the gazette, and a summary in Appendix III. The Kerala Government has not handed over the settlement records for the Shencottah forests up till now; and the rights and conceessions admitted are unknown.

38. Regarding the ex-estate forests, it is learnt that people were enjoying various concessions like free grazing, free removal of fuel and agricultural implements for domestic use, etc., in addition to unfettered entry into the forests; often there were disputes between the people and the Zamindar over their rights and concessions which at times were fought out in courts of law. When Government took over these estate forests, all these rights and concessions except rights of way were extinguished; but great difficulty is experienced by the staff in enforcing this law because people have not yet learnt to appreciate the value of labour. We can hope for better conditions when forest settlement proceedings are taken up for these forests.

39. *Royalties.*—According to section 52 (i) of the Travancore-Cochin Forest Act, Teak, Rosewood, Ebony and Sandalwood trees growing even on private lands are the property of the State and are called Royalties; the land-owner cannot appropriate such trees to himself unless (a) the Government sells them to the rightful land-owner at specified rates (b) or he takes them in public auction from Government before or after such trees are departmentally extracted and taken to a timber depot. However, a portion of the sale proceeds of such 'Royalties' known as ' Kudivila ', is given to the land-owner. For purposes of Royalties and Kudivila, in 1927, the Travancore-Cochin State had divided the private lands into tracts I, II and III; which the Government ceded its rights over tracts I and II a few years ago, it retained to monopoly over tract III by extending it every time the period expired. This right is now being exercised by the Madras State under G.O. Ms. No. 1276, Food and Agriculture, dated 18th March 1959, since the whole of Shencottah taluk fell under tract III. Since the Kerala Government extracted all the 'Royalties' in Shencottah taluk before handing over the taluk to Madras State, the whole position has to be reviewed again by Government for a reappraisal of the policy towards the coppice shoots from the stumps of extracted trees.

40. *Cardamom and other estates.*—There is no ambiguity about the status of cardamom and other crop estates inside the reserved forests; but inside the Sivagiri ex-Zamin forest lie six estates of about 683 acres in all, growing cardamom and coffee. At present these estates are claimed as private properties bought from the zamindar before Government took over the Zamin. The extents of these estates are also not definite and not properly demarcated; since the whole matter is fraught with legal complications, the question of their status is left to the decision of a Settlement Court. Judgment on all these cases is pending. A list of such estates in Sivagiri ex-Zamin forest and a list of regular leases inside the reserved forest are given in Appendix IV.

CHAPTER—II.—THE FORESTS

SECTION 1—COMPOSITION AND CONDITION OF CROP.

41. In a compact division like this, it is interesting to find wide variations of climatic conditions, like the annual rainfall of 200 inches in the evergreens, in contrast with the 20 inches in the degraded plains. In geeneral soil conditions do not exhibit marked difference except in narrow valleys and along steams where the alluvium supports a better type of vegetation than the surrounds. On the physical side, elevations ranges from 90 to 6,000 feet; and areas of the same elevation on the higher reaches do not always support identically the same luxuriant growth. But one constant feature is that, wherever the rainfall is at its best as in the interior ghats, we get the best form of vegetation, and wherever it is low, the vegetation is also poor however excellent the other factors might be. Constant set backs due to fire, theft and over grazing maintain the vulnerable regions in a sub-normal condition.

42. Following the classifiaction of forest types in India by Champion (1935), we can distinguish four types of forests in the division. The line of distinction between any two types may not be abrupt, none the less, their characterstic features cannot be missed even by a casual visitor. Further, within the general types, due to microclimatic variations and edaphic factors, subsidiary types manifest themselves.

The four types are :—

(1) Southern Tropical Wet Evergreen Forest—Western Tropical Evergreen [Group 1 (a) C. 3].

(2) Southern Tropical Moist Deciduous Forests (Group 3 a-C. 1).

(3) South Indian Dry Mixed Deciduous Forest [Group 4 (a)-C.2].

(4) Carnatic Umbrella Thorn Forests [Group 5 (a)-C. 2].

1. *Tropical Wet Evergreen Forest.*

43. Otherwise called a shola, this is the most highly developed ecological type of vegetation in the division, confined largely to the interior parts of Ambasamudram range and to a lesser extent to the upper reaches of the other ranges. It begins to appear at an elevation of 2,000 feet in the interior ghats and extends up to about 4,500 feet, thereafter deteriorating in quality, height and volume per acre to resemble a montane sub-tropical forest. The luxuriant growth reaches its zenith between 2,500 and 3,500 feet elevation, where the dominants of the top canopy attain a height up to 150 feet with straight clean boles of 60 to 70 feet and girths up to 12 feet and over at breast height. Outstanding in the midst of the sholas are vast stretches of pure reeds in the more moist interior. The inhospitable precipitous rocks and rocky grounds are covered by grass, *Phoenix acaulis* and species of the family Myrsinaceae, while the sheltered faces and moist depressons of peaks offer a foothold to the shola species. A good portion of the sholas near Kannikatty was subjected to shifting cultivation by the Kanis—a hill tribe; but this damage has now been averted by resettling them in a permanent colony. These old Kani clearing can still be spotted in the Kariar Valley by the secondary growth of *Macaranga roxburghii, Macaranga indica, Clerodendron infortunatum, Trema orientalis, Solanum pubescens, Albizzia stipulata, etc.*

44. Contrary to expectations, the soil is very shallow, hardly extending to a foot from the surface as can be seen from the cut faces of roads and bridal paths. Boulders and rocky outcrops are in plenty all over the ground, and on ridges the ground is a lateritic gravel, revealing no humus contents. There is a constant accumulation of leaf litter and twigs on the floor harbouring a rich variety of micro-flora and micro-fauna, but the very rapid decomposition and assimilation of this litter leaves no visible humus on the top soil. These forests appear to live on the products of their own decay. The dense stand and, the rich leaf fall so effectively cover and protect the soil from erosion that, even if there is a downpour for months together, one cannot see anything but crystal-clear run off water in these sholas. Another notable feature is that drainage is good throughout the forest except on flat hill tops, where there is some clay, the evergreen steps down in favour of reeds. Rocky and precipitous slopes are colonised by the palm *Bentinckia coddapanna*, while moist semiswampy hollows are favoured by the palms *Arenga weightii* below 3,000 feet and *Pinanga dicksonii* above 3,000 feet.

45. The cool pleasant weather all through the year, the scenic beauty of the forests and the steady songs of the various birds make this place a most enchanting part of the world. The temperature oscillates between 65 F. and 80 F. with a high humidity. The average annual rainfall varies from 150 to over 200 inches with only three months in the year receiving less than two inches rain to be called a dry season. With a decrease in rainfall the minimum elevation at which the shola appears increases. Unlike in Ambasamudram range, the sholas in Kuttalam Range are generally poor in quality and exploitable species. The poorest type of shola forest is found in Sivagiri hills, where it appears at 3,500 feet and rapidly deteriorates above 4,000 feet, for the annual rainfall even in the best parts does not exceed 80 inches. *Gluta travacorica* is also absent in Sivagiri hills. It will thus appear that the principal governing factor of the evergreens is the rainfall.

46. Frost is unknown in the region. On the whole the species are fire-tender, and in the early years shade loving; growth is slow and they do not show true annual rings. Most of them have no tap root and the shallow root system hardly extends to a foot below ground level—an adaptation to suit the plentiful supply of moisture and nutrients available at the surface itself. But this has the disadvantage of trees near gaps and road clearings getting easily uprooted by the strong south-west winds. Long cylindrical boles with thin smooth bark and plank buttresses are typical as can be seen in *Cullenia excelsa, Gluta travancorica, Myristica sp.*, etc. Leaves are generally coreaceous and glabrous, only rarely tomentoze, and the tender leaves which appear from January to April are very often white or pink. Cauliflory, as *Polyalthia sp., Cullenia excelsa, Artocarpus integrifolia* is relatively common. Epiphytic ferans, mosses and orchilds are numerous. Compared to the moist and dry deciduous forests, climbers are practically absent in these sholas. Canopy is extremely dense and homogenous, and with reference to the heights attained by the mature trees of different species layers or tiers can be recognised.

47. Principal species of the top storey are:—

Cullenia excelsa.
Mesua ferrea.
Palaquium ellipticum.
Gluta travancorica.
Hopea parviflora.
Heritiera papilio.
Canarium strictum.
Dysoxylum malabaricum.
Hardwickia pinnata.
Eugenia gardneri.
Eugenia Rama Varma.
Myristica beddomei.
Elaeocarpus munroii.
Mangiferra indica.
Vitex altissima.
Balanocarpus utilis.

Salmalia malabaricum.
Vateria indica.
Alstonia scholaris.
Polyalthia fragrana.
Elaeodendron glaucum.
Carallia integerrima.
Diospyros bourdillioni.
Litsea wightiana.
Elaeocarpus tuberculatus.
Poeciloneuron pauciflorum.
Bischofia javanica.
Aglaia roxburghiana.
Anacolosa densiflora.
Diospyros microphylla.
Acrocarpus fraxinifolius.

48. Species constituting the second storey are :—

Myristica malabarica.
Garcinia echinocarpa.
Artocarpus integrifolia.
Artocarpus hirsuta.
Nephelium longana.
Cinnamomum gracile.
Cinnamomum iners.
Actinodaphne hookeri.
Lansium anamallayanum.
Pygeum wightianum.
Garcinia cambogia.
Garcinia travancorica.
Garcinia morella.
Litsea zeylanica.
Caryota urens.
Arenga wightii.
Filicium decipiens.
Hydnocarpus alpina.
Mallotus philippinensis.
Agrostistachys longifolia.
Podocarpus latifolia.
Pinanga dicksonii.
Pandanus tectorius.
Gordonia obtussa.

49. The undergrowth consists principally of the following species :—

Calamus pseudotenuis.
Laportea crenulata.
Balanophorus sp.
Strobilanthes sp.
Carcuma angustifolia.
Calamas travancoricus.
Solanum verbascifolium.
Selaginella sp.
Ochlandra sp.
Vallaris sp.

50. *Association.*—Some of the cosmopolitan species in the sholas are *Cullenia excelsa*, *Elaeocarpus serratus* and *Artocarpus integrifolia*, of which *Cullenia excelsa* attains a height of 120 feet of elevations of 2,000 to 3,500 and deteriorates to about 40 feet at elevations of 4,500 and over. Within the general range of distribution one can find local variations and preponderance of certain species in some localities.

(i) In the less moist outer and lower limits of the evergreen zone, as in the region above Kodamadi and Thukkanmottai between 2,000 and 2,200 feet, *Balnocarpus utilis*, *Mesua ferra* and *Hopea pariflora* predominate the composition. Some of the finest specimens of *Salmalia malabaricum*, *Mangifera indica*, *Alstonia scholaris* are found in this zone; in the higher limits, Vateria indica makes its appearance. Other important species of this region are *Filicum dicipiens*, *Cedrela toona*, *Vitex attissima* and *Hardwickia pinnata*. This may be called the Hopea-Balanocarpus-Mesua association.

(ii) In that part of the evergreens falling between 2,200 and 3,000 feet elevation and getting about 150 inches of rainfall *Cullenia excelsa and Mesua ferra*, preponderate; though the proportion of these two species is greater than that of the other species, their incident by themselves is not high by virtue of the large number of species in this zone. *Veteria indica* and *Mangifera indica* in the lower limits and *Gluta travancorica* in the higher limits are common. In the second storey *Agrostistachys' longifolia*, *Garcinia echinocarpa*, *Elaeocarpus serratus* and *Cinnamomum sp.* are abundant. This can be called the Cullenia—Mesua association.

(iii) In the Peyar and Walayar valleys and near Kauthaparai where the rainfall is as high as 250 inches, on better well drained soil is to be found the very best of the evergreen forests, in which *Cullenia excelsa* and *Palaquim ellipticum* predominate the top canopy. Specimens of 150 feet height and 12 feet in girth are not uncommon. In this zone is to be found the only indigenous conifer, *Podocarpus latifolia* and an abundance of the dreadful devil's netter *Laportea crenulata*. The other species contributing to the top canopy are *Mesua ferra*, *Dysoxylum malabaricum*, *Canarium strictum*, *Artocarpus integrifolia*, etc. This climatic climax found between 2,500 and 3,300 feet elevation may be called the *Cullenia*—Palaquium association.

(iv) In the higher reaches, on rounded hill tops of about 4,000 feet elevation receiving about 200 inches of rainfall and where the soil is not clayey, the typical species are *Eugenia ramavarma*, *Calopyllum trapezifolium*, *Garcinia travancorica*, *Cullentae excelasa*, *Polyalthia sp.*, *Vernonia travancorica*, *Artocarpus integrifolia*, *Litsaea zeylanica*, *Elaeocarpus munroii*, etc.

(v) In moist hollows and pockets, where the soil is ill-drained and rather soft, monocots tend to assert themselves. The principal species are *Pinanga dicksonii* above 3,000 feet, *Arenga wightii* below 3,000 feet, *Curcuma latifolia*, tree-ferns, reeds *Musa sp. Polygonum sp.* and cardamom. It must, however, be noted that in such places the amount of light reaching the ground is far greater, and this may also contribute to the floristic difference. The two species of palms metioned are generally gregarious.

(vi) In the rain sodden interior, close to Kerala State where the soil tends to be a pale brown clay and swampy, an edaphic climax expresses itself with the two common reeds, *Ochlandra travancorica* and *Ochlandra brandisii*, often stretching to miles and miles like a sea, to the exclusion of all other species. The ground is literally covered with reed leaves and dead culmps to an inch or two, and to see the soil one has first got to dig through this debris which offers no foot-hold to any other seed or seedlings. Here and there in their midst isolated specimens of *Vernonia travancorica Eugenia ramavarma*, etc., stand out helplessly unable to propagate themselves. The ecological status of this will be discussed while dealing with reeds later in this chapter.

51. *Colonisers in Cleared Shola.*—In the undisturbed shola, grass is conspicuous by its absence, and *Selaginella* and saprophytic *Balanophoras* by their presence. The converse is the case in cleared sholas. With the letting in of light over a cleared patch, the first to take possession of the ground is grass and then bracken and *Vallaris sp.* If the mat of grass is thick and undisturbed or uninterrupted by boulders, it succeeds in denying a foot-hold to other species; in this respect the worst is the buffaloo grass (species not known) introduced in cardamom estates, as an excellent soil binder. The next in order. to colonise wherever the grass is wounder are *Clerodendron*, *infortunatum*, *solanum verbasifoluin*, *Mallotus philippinensis*, *Macaranga roxburghii*, *Macaranga indica*, *Leea sambucina*, *Trema orentalis*, *Alzixxia stipulata*, Cardamom, etc. In the higher regions at 4,000 feet and above, *Vernonia travancorica* and *Osbeckia spp.* came up earlier, and in the lower moist depressions *Musa spp.* and *Curcuma latifolia*. This is secondary growth of fast growing inferior species may be regarded a undesirable, but it is nature's device to create a forerunner to enable the evergreen species later to re-establish thmslvs under the shade and then oust the forerunner in course of time.

52. *Natural regeneration.*—Mr. T. A. Whitehead wrote in 1930 that two varieties of *Mesua ferrea* were distinguished with reference to size, colour and venation of the leaves and seeds. The local people call them " Peria nangu " and " Siru nangu " although no distinction in the wood is made. Seeds of " Peria nangu " are ripe for collection in April-May, while those of " Siru nangu " ripen in December and earlier at lower elevations. The cinnamon species of the Sholas were settled by the Forest Botanist as *Cinnamomum gracile* and *Cinnamomum iners*.

53. Flowering, fruiting and ripening of seeds vary for the different species; one interesting feature is that all through the year some species or other is in seeds. This suggests that the process of natural regeneration in the evergreens is an eternal process. The time when seeds ripen is given for the more important species :—

Mesua ferra (Peria nangu)	April—May.
Mesua ferra (Siru nangu)	December and September at lower elevations.
Gluta travancorica	May—June.
Balanocarpus utilis	October—November.
Palaquium ellipticum	Do.
Calophyllum trapezifolium	Do.
Aglaia roxburghiana	November—December.
Poeciloneuron pauciflorum	December.
Elaeodendron glaucum	Most of the year.
Eugenia sp	December—February.
Filicium decipiens	March—April.
Vateria indica	September.
Cinnamomum sp	September—October.

Cedrela toona	April—July.
Artocarpus integrifolia	March—April.
Hardwickia pinnata	October.
Garcinia echinocarpa	January—March.
Cullenia excelsa	December—February.
Acrocarpus fraxinifolius	March—April.
Chuckrassia tabularis	February—March.

54. The number of seeds devoured by rodents and monkeys is great, especially those of *Mesua ferra* by the Malabar squirrel. Seeds of *Eugenia sp.*, *Artocarpus integrifolia*, etc., by birds and animals and those of *Balanocarpus utilis*, *Hopea parviflora*, reeds, etc., by streams are widely dispersed; and this accounts for the Hopea trees near Mundanthorai bungalow at 500 feet elevation. Regeneration is generally good and sufficient, sometimes it is too much as in the case of *Gluta*, *Balanocarpus*, Mango, etc.; but the heavy shade gives no chance for the seedlings to grow up. This accounts for the general deficiency of the pole crop.

55. *Gluta travancorica.*—The genus *Gluta* in India is represented by one species, *Gluta travancorica*, confined to these forests and the sholas of adjoining Singampatty and Kerala State, but does not occur naturally anywhere else. Under ideal conditions it attains a height of over 100 feet and girth of over 9 feet, restricting itself to an elevation of 2,500 to 3,500 feet. It grows slow and tends to be branchy and less useful, if not grown close. Flowers in February to May and fruits ripen after a year. There are 84 seeds to a Madras measure; fruits are untouched by animals because of the acrid juice in it. Mature and over-mature trees of over 8 feet girth seed better than younger trees and this restricts over girth limit for felling. Germination is hypogeal as in mango. Seeds left lying in the forest germination sooner than seeds collected and stored before sowing. Best time to sow seeds is from 20th May to 4th June, for, before 20th May, it is not easy to collect sufficient seeds and after 4th June heavy rain and leeches make work in the evergreen forest unpleasant. In August-September a second sowing can be done.

56. Germinating seedling takes two months to produce a taproot of six inches long and during this period there is no growth above ground level. The seed then rapidly throws up a needle-like plumule of six inches long after the radicle has developed, and then the leaf bud at the top starts expanding into a tuft of leaves. This is all the growth it puts forth in the first year. Wherever there has been an opening round about a Gluta tree due to wind fallen trees, a good regeneration is noticed. In some places it is a carpet of seedlings. It seems to require a light high over-head shade and probably a little more than some other species in the early stages; and a congested or close grown crop in later years produces better bole form. In 1917 one Gluta tree was felled for an exhibition; over an area of 15 feet square under the tree Mr. D. T. Barry counted the following seedlings:—

Gluta	47
Mesua	3
Dysoxylum	2
Hopea	1
Eugenia	15
Cullenia	1
Pygeum	2
Total	71

It means two-thirds of the seedlings are *Gluta* and this works out to 9,100 seedlings to an acre. On another occasion over a patch of 10 feet square he counted 160 seedlings. It can grow on grass-land if the grass is not allowed to suppress it and if there is some shade. In nature, where there is shade, there is very little grass and thus conditions are favourable for *Gluta*.

57. It seeds well almost every year. Nursery seedlings of one year old look yellowish and unhealthy. But after three years the same seedlings look healthy. One year old seedlings can be successfully transplanted and tolerate even severe damage to the taproot. But direct sowing gives even better results. Excessive light invites grass, *Clerodendron*, *Lantana*, etc., which choke up *Gluta* seedlings. Constant weeding is necessary.

58. The beautiful reddish wood takes good polish and a smooth finish for furniture; but it is heavy and brittle. Its disadvantage is the large amount of sapwood a mature tree contains. In a felled tree of 2½ feet diametre there is one foot of sapwood. Big trees are generally hollow and the outturn is only about 20 per cent. Mr. W. C. Hart records in 1920 that a tree of 12½ feet girth had nine inches thick of sapwood. This works out to 40 per cent heartwood and 60 per cent sapwood; On the other hand sapwood in *Balanocarpus*, *Mesua*, *Dysoxylum*, etc., is negligible. A fine plantation of *Gluta* raised in 1914 by direct sowing exists close to Kannikatty bungalow on an old Kam clearing; it was once thinned in 1937 in all its lifetime and now the congested poles are about 45 feet high.

59. *Balanocarpus utilis.*—This is a tree common in the lowest limits of the evergreens of Ambasamudram range and, probably in Kerala also. It occurs in valleys and especially along the banks of rivers, streams and ravines at elevations varying from 1,500 to 2,000 feet; but in Servaiar valley it descends down to 1,000 feet. It does not grow as tall as *Hopea* but attains greater girth and often tends to be unsound. Wood is darker in colour and coarser grained than *Hopea*, and it is called 'Karumkongu' in Tamil.

60. Flowers in March-May and fruits ripen in October-November. The inflorescence is in axillary panicles, the flowers being arranged unilaterally. The indications are that two or three good seed years are followed by two or three poor seed years, probably due to the variations in the south-west winds on which pollination depends. There are 250 to 280 seeds (average 265) to a Madras measure; seeds loss their viability very soon. Within a day or two of falling to the ground, seeds germinate and the radicle with a cop emerges. After three or four days the seed coat is shed and the cotyledons make their appearance. When the stem below the cotyledons grow to a height of about six inches, the needle shaped plumule puts forth the leaves. Seeds broadcast sown germinate better than those dibbled, but pigs eat seeds, therefore dibbling gives better results. The seedling requires good deal of shade for about two years: in the open and insufficiently shaded areas it dies back. Natural regeneration is profuse and at times it is too much, but the representation of middle age classes is generally poor.

61. *Reeds.*—Beyond the evergreen zone and closer to Kerala border, are vast stretches of Eta reeds often to the exclusion of all other species. The identical species of reeds are *Ochlandra rheedii*, *Ochlandra travancorica* and *Ochlandra brandisii*; but the presence of some unfamiliar specimens suggests the possibility of new species also. In relation to the sholas, there are three grades of reed incidence :—

(1) Reed in small clumps under sholas.
(2) Reed and shola in equal proportions.
(3) Pure reed to the exclusion of other species.

62. In the lower elevations, below 2,500 feet, along stream and river banks grows the small reed, *Ochlandra rheedii* as small clumps of undergrowth. Likewise, in slightly higher elevations, sporadic clumps *Ochlandra travancorica* be found along river margins in the heart of sholas, probably grown from seeds washed down by the streams originating at the pure reed areas above. Under the evergreen shade these reeds are thin and lanky, some reaching 25 feet; their existence is always precarious. The sholas are a climatic climax and the status of reeds is insignificant.

63. In still higher regions, in the neighbourhood of 3,500 to 4,000 feet, in some places reed and shola co-exist equally. The ground is neither hard as in a shola nor soft and clayey as in a pure reed area, but of intermediate texture and drainage. There is a good deal of leaf fall from the trees that cover the soil fully; and regeneration is ample. The principal shola species are *Vernonia travancorica*, *Eugenia sp.*, *Calophyllum trapezifolium Eleocarpus serratus*, *Elaecarpus munroii*, *Artocarpus integrifolia*, *Garcinia echinocarpa*, *cullenia excelsa*, *etc.*, but the stand is never so very rich as in a pure shola. Some of the species like *Mesua ferrea*, *Glutta travancorica*, *Palaquium eliptticum*, etc. are less numerous. Under these trees thrives a uniform underwood of *Ochlandra travancorica* reaching 15 to 25 feet in height but not to a smoothering and sweeping extent as to prevent regeneration of the shola species. On flat hill tops, however, reed also becomes less impressive. Apparently, the reed, and shola are in an equilibrium, but perhaps, one of the other may take the upper hand at the slightest disturbance from outside agency. From the amount of natural regeneration found on the ground, it will be reasonable to assume that the shola species are strong and dominant.

64. The extreme type is a pure sea of reeds, except for a few isolated trees of shola species standing out in sheltrd pockets and along well drained stream banks. Also to be seen at several places are the transitional stages in the gradual process of reed ousting the shola. The reeds are *Ochlandra travancorica* and *Ochlandra brandisii* which grow to a height of 10 to 15 feet forming an impenetrable mass. Dead culms and dry leaves form a crust over the pale yellowish soft clay allowing no seed or seedling a chance to

establish. Even under fruiting trees of isolated *Vernonia travancorica*, *Eugenia remavarmi*, *Cullenia excelsa*, etc., that peep out of the reeds, one cannot find their seedlings. Thus obstruction to natural regeneration seems to be the clause for the sholas inability to regain its lost ground; and consequently, incourse of time when the mature trees perish without a progeny, pure reed inherits the site. The weak point of a shola is the hill top and this seems to be the starting point for the reeds, whose globse fruits roll down the slopes and start new clumps. Further, the weathering of the gneissic rock into a clayey soil on the hills with a montane temperate climate initiates this process towards an edaphic climax.

2. *Southern Tropical Moist Deciduous Forests.*

65. These are the most highly paying forests of the division, confined to those of Puliyara, Vadagaraimelpidagai, Kuttalam, Kodamadi, Kariar, etc., with an elevation of 500 to 1,000 feet and an annual rainfall of 60 to 80 inches from both monsoons. A dry season of four to five months in the year is a characteristic feature. Trees are generally leafless from February to May. On the upper limits it merges with the evergreens and in the lower limits, where grazing and fires come into play, it blends with dry deciduous type. The original stand is a good high forest in which the dominants attain a height of 60 to 85 feet. The undergrowth consists mainly of evergreen species.

66. The principal species constituting this type are :—

Balanocarpus utilis
Stereospermum chelonoides
Terminalia paniculata
Terminalia bellerica
Pterocarpus marsupium
Dalbergia latifolia
Teak
Albizzia odaratissima
Salmalia malobaricum
Dillenia pentagyna
Anogeissus latifolia

Lagerstracemia lanceolata.
Alstonia scholaris
Cureta arborea
Phyllanthus emblica
Grewia tiliaefolia
Schleichers trijunga.
Vitex altissima
Melia dubia.
Tetrameles nudiflora.
Bridelia retusa.

67. The understorey is formed by the following species :—

Bauhinia racemosa
Wrightia tinctoria
Holarrhena antidysenterica
Strychnos nuxvomica
Hydnocarpus wightiana
Tabernaaemontana heyneana

Cassia fistula.
Mallotus philippinensis.
Ficus hispida.
Kydia calycina.
Cycas circinalis.
Helicteres isora.

68. Species forming the undergrowth are :—

Clerodendron infortunatum
Glycosmis pentaphylla
Hibiscus lampas
Eupatorium sp

Lantana camera.
Strobilanthus sp.
Grasses.

In cleared areas and gaps *Strobilanthes* and *Eupatorium* are the first to take possession of the ground and often to a dense impenetrable mass much to the detriment of any natural regeneration.

69. Climbers are heaviest and some of the species met with are *Acacia intsia*, *Acacia pennata*, *Acacia conciana*, *Spatholobus roxburghii*, *Calycopteris floribunda*, etc.

70. Since most of the species are light demanders, age gradations are absent and natural regeneration is sparse or gets killed. However, sapplings and seedlings of *Pterocarpus marsupuium*. *Terminalia paniculata*, *Dalbergia latifolia* are not uncommon Clearfelled areas are quickly covered by *Macaranga indica*, *Macaranga roxburghii Trema orientalis*, *Mallotus philippinensis*, *Eupatorium*, *Lantana*, *Strobilanthes*, climbers, etc. On clearfelled sites, planted species do not attain the same growth as the original stand, probably because of the top soil and humus being destroyed.

3. *South Indian dry mixed deciduous forests.*

71. This occurs along the foot hills and outermost slopes up to an elevation of 600 feet. Soil is extremely hard and shallow with numerous rocky and bouldery outcrops; due to their proximity to village, heavy grazing, frequent fires and theft are traditional feature. Added, most of our fuel coupes are located in this zone. The annual rainfall

of about 30 to 50 inches is precipitated chiefly by the north-east monsoon, between October and January leaving the rest of the year practically dry. Even this monsoon is seldom regular and the amount of moisture that percolates is a small proportion. The trees, therefore, are leafless for half the year exposing the ground to a scorching sun. The high density during the rainy season and the large number of stems per acre gives an exaggerated impression of the forest. In moist depressions, valleys and along river banks growth is markedly superior. Generally above this zone in the outermost slopes is a belt of thatch or lemon grass with a few scattered trees, brought about by frequent fires. Growing season is short and with the poor food materials they do not attain great size; general height of trees is about 30 feet.

72. Species constituting the top canopy are :—

Pterocarpus marsupium
Tamarindus indica
Azadirachta indica
Albizzia lebbek
Albizzia amara
Givotia rottleriformis
Acacia sundra
Acacia suma
Acacia ferruginea
Zizyphus xylopyrus
Ficus bengalensis
Semecarpus anacardium
Hymenodictyon excelsum
Zizyphus trinervia

Anogeissus latifolia.
Terminalia chebula.
Chloroxylon swietenia.
Sapindus emarginatus.
Gyrocarpus americanus.
Dalbergia paniculata.
Morinda tinctoria.
Protium caudatum.
Balsamodendron berryi.
Dichrostachys cinerea.
Acacia leucophloea.
Eugenia jambolana.
Careya arborea.
Phyllanthus emblica.
Hardwickia binata.

73. The underwod is formed by the following species :—

Mallotus philippinensis
Streblus asper
Grewia asiatica
Erythroxylon monogynum
Fluggea leucopyrus
Atalantia monophylla
Webera corymbosa
Santalum album

Strychnos potatorum.
Gmelina asiatica.
Randia dumetorum.
Capparis sp.
Dalbergia multiflora.
Carissa spinarum.
Ixora parviflora

74. Some of the familar climers and shrubs are *Zizyphus ocnoplia*, *Hugonia mystax*, *Pterolobium indicum*, *Achyranthes aspera*, etc.

75. *A teak variety.*—In the foot hills of Sivagiri, T. N. Puthukudi and Vasudevanallur and near Mundanthorai which fall under this type of forest, grows a stunted variety of teak, which attains a maximum height of 20 feet and six inches diameter at breast height. Coppice shoots of this teak attain this height in 4 or 5 years and thereafter stagnate. The leaves are usually smaller, elliptic ovate with a slight wavy margin, acuminate tip, a silvery glabrous under surface and a distinct petiole of 2½ to 3 inches. Unlike in other tracts, in this region leaves begin to fall in March-April and new leaves appear in August-September. Strangely, it comes into flower in December-January when the conventional teak is with ripe fruits falling to the ground. Fruits ripen in April-May. In some places this teak extends to 500 acres and over forming 80 to 90 per cent of the crop. Seeds from this teak should never be collected for nurseries.

76. *Natural regeneration.*—This is very unsatisfactory. Immediately after clear-felling, a dense mass of weeds and climbers cover the area choking most of the seedlings and coppice shoots; such of the seedlings as are able to escape succumb to the heat of the following summer. This natural inpediment, repeated fires and indiscriminate cutting bring about the retrogression.

4. *Carnatic umberlla thorn forests.*

77. Otherwise called as scrub jungle, this is confined to the plains in which lie the forests of Uthumalai, Vellakalparambu, Mayamankurichi, Sivalarkulam and Kottamalai. Soil is very shallow, hard and gravelly with a mixture of quartzite. The annual rainfall of 20 to 25 inches derived from the north-east monsoon is poured down in a few rainy

days leaving almost a period of ten months without rain. Forest is very open, trees do not reach more than 10 to 15 feet in height and develop short stems and low branching crowns. Most of them exhibit xerophytic characters like spines, thorns, and tomentose coreaceous leaves. There is a uniform but light cover of grass during the rainy season.

Acacia planifrons is represented throughout; on saline sites *Acacia latronum* takes the place. Principal species found are :—

Acacia planifrons
Acacia latronum
Albizzia amara
Dichrostachys cinerea
Cassia auriculata
Euphorbia antiquorum
Erythroxylon monogynum
Carissa sp.
Randia dumetorum
Cuscuta sp.
Mundulea suberosa
Zizyphus xylopyrus.
Zizyphus jujuba.
Balsamodendron berryi.
Dalbergia multiflora.
Dodonea viscosa.
Fluggea leucopyrus.
Carissa sp.
Zizyphus oenoplia.
Hetropogon contortus.
Cassytha sp.

79. Natural regeneration is practically absent.

80. *Teak plantations.*—The first teak plantation in the division was raised in 1907 by Mr. R. D. Richmond over 0.91 acre at Kariar in Ambasamudram range; but this along with other plantations of later years had to be clearfelled in 1940 as they fell within the submergible area of Hope Lake. At present the oldest teak plantation is a 3 acre preservation plot laid out of the 1917 plantation at Kodamadi. The plantations are situated chiefly at Kariar, Kodamadi, Servaiar, Kuttalam, Vallam, Adavikadu and Vadagarai melpidagai; plantations in other areas are too poor and small.

81. On the whole, the Kodamadi and Kuttalam plantations have done well while the rest have fared badly due to neglect, unsuitable site and invading nature of the semi-evergreen species as in Servaiar series. The plantations of Kariar and Servaiar have been raised in a site which originally supported a semi-evergreen forest and receiving excessive rainfall for teak. Thinnings were seldom regular, and when done, they were grossly light as can be seen from the present espacement in most of the older plantations. Wherever the semi-evergreen species or other miscellanous tree growth diluted the teak plantations by natural invasion as in Servaiar and Kariar series or by artificial introduction as in 1937 and 1938 Kuttalam series, they have become a powerful rival robbing the teak of its nourishment; consequently teak is thin and lanky though dominant. The following table will illustrate this :—

	Girth at breast height in inches.	
Age.	*Kuttalam series.*	*Servaiar Kariar series.*
(1)	(2)	(3)
10	13	12
15	25	17
20	31	21
25	37	25
30	40	28
35	43	31
40	46	33

NOTE.—Figures were read from smooth curves drawn from field data.

On a loamy clay exhibiting surface cracks, as in Vadagarai-Melpidagai and Puliyara forests, it becomes stag-headed and fruits in four or five years. Wherever the loan has combined with less of clay and more of sand as in the Kuttalam plantations of 1932, 1934, 1941, 1942, teak attains its best form and a height of 60 to 70 feet and a girth of 3 feet in about 20 to 25 years. Generally speaking, gentle concave slopes and depressions support a better teak than steeper or rounded slopes do. *Glycosmis pentaphylla, Mallotus philippinensis, Murraya exotica*, and poor specimens of *Helicters isora* are generally found as undergrowths of the best plantations; *Mimosa pudica* and *Randia dumetorum* co-exist with poor quality teak. The flowering season is July-August and seeds become ripe in December-January.

82. According to the revised All-India teak yield tables, the ruling quality classes in the division are III and IV. A list of the plantations can be found in Appendix V.

83. *Matchwood plantations.*—Since 1957 *Ailanthus* excelsa and *Salmalia malabaricum* have been raisde on the Mundanthorai plateau, which gets the benefit of both the monsoons, and in Sivagiri forest which gets an erratic rainfall from the retreating

monsoon. With an espacement of 16½ feet by 16½ feet, with teak in quincunx and in conjunction with a Kumri crop of tapioca there is 95 per cent stocking in Mundanthorai plantations. As against this, the Sivagiri plantations are a poor show for several reasons.

84. *Fuel plantations.*—From 1954 afforestation of dry fuel forests was taken up under the Second Five-Year Plan in the ex-panchayat and ex-zamin forests in the plains. On the whole, these are a failure, judged from the survival per cent. However, it is interesting to note in one or two years, there had been better results, especially with Vagai, Neem and Odai; which the local people attribute to good rains. In general there has been a gradual decline in stocking after every summer. The poorest results are to be seen in Sivalarkulam and Mayamankurichi, since the site is the most inhospitable. However, the performance of species like Neem, Vagai and Odai in Uthumalai forest, where the soil is good, indicates that soil suitability is more important for this work.

85. *Exotics.*—Though *Bambusa arundinacea* occurs indigenously in Shencottah and Kuttalam ranges, it was originally absent in the other ranges, and all the bamboos we see in Ambasamudram range were artificially introduced. It is very strange that this species did not evolve with the rest of the flora in Ambasamudram range. The first attempt to introduce this species was made in 1884 in Aladiyur beat by Mr. Haynes; the success of this experiment gave impetus to extent the plantations to other areas also.

86. The fact that the Ceylon variety of *Chloroxylon swietenia* grows faster and attains greater sizes encouraged its introduction opposite to the Mundanthorai bungalow in 1925. Unexpectedly the species fared very badly in the division leaving only one or two trees as survivals. Likewise, attempts made in the evergreen forests to introduce *Cinnamomum zeylanicum* from Ceylon failed.

87. Between 1887 and 1889 Mahogany (*Swietenia mahagonii* and *Swietenia macrophylla*) was planted in Mundanthorai and Kuttalam bungalow compounds. Under-planting in teak plantations did not meet with success. Between 1930 and 1931 *Cassia siamea* and *prosopis juliflora* were introduced in fuel coupes. There are two trees of clove (*Eugenia caryophyllaea*) in the Kuttalam rest house compound and attempts have been made this year, to introduce it in the evergreen forests also. *Eucalyptus hybrid* planted over an acre near Tiger Falls in 1954 has done very well; patches of *Casuarina equisetifolia* raised in the same locality in 1954 are growing well.

88. Except to serve as information of interest, these exotics have not brought about any radical change in the economy of the division.

89. The kumri plantations of 1945 to 1947 raised with Tamarind, Vagai, Neem, *Acacia ferrugenia*, etc., near Tiger Falls and of 1954 near Tharavittanparai are worth seeing. The good growth and high percentage of stocking are due to the favourable soil conditions rather than rainfall.

Section 2—Injuries to Which the Crop is liable.

90. In the plains and outer slopes wind causes some damage to teak plantations in the form of bent tree, and occasionally as broken stems. Damage in the evergreen forests is pronounced near road margins and clearings as the surface rooted species are unable to withstand the gales of the south-west monsoon: and when they fall, the damage inflicted on other poles and saplings is even greater.

91. The retreating monsoon is generally erratic and uncertain pouring out in a few days; drought conditions usually follow such failures. This in turn brings about heavy casualties or failure in regeneration areas of the plains and outer slopes that depend upon the north-east monsoon. In fact this has rendered the problem of dry fuel forest regeneration difficult to solve. Most of the natural regeneration in the dry deciduous forests and fuel coupes, that has come up after the rains, gets a set back in the heat and drought of the following summer, for the south-west monsoon does not confer its benefit on those areas.

92. *Man.*—At one time, the Kanis (a hill tribe) cleared extensive virgin forests in the evergreen zone to promote their habit of shifting cultivation: but fortunately this ended when they were resettled at Injukuli and made to grow their own food on a permanent field. Some of them, however, still stick on to their original habit by taking up kumri cultivation in regeneration areas.

93. Much of the damage to the forest is caused by the villagers in the plains who make thieving from the forest as their profession. Illicit removal of fuel, small timber for agricultural implements, teak for house construction and any wood for sale, is a problem in the forests of Sivagiri, Vasudevanallur, Aladiyur beat and Kadayam beat. They go in groups or armed gangs who frequently challenge and injure the forest staff; any number of convictions in court does not seem to have any effect on them. The law-abiding nature of people is so little in those parts that the offenders and their relatives often try to wreak vengeance on the forest staff outside the forest limits. The people of Papanasam, Vickramasingapuram and the adjoining villages are a perpetual menace to the forest of Papanasam; demand for fuel and difficulties to protect were so great that, to solve the problem, a new series called the Aladiyur fuel series had to be opened under this working plan. More than the selective removal of trees, haphazard cutting at irregular heights without properly coppicing the stumps cause damage to the forest. Theft from teak plantations is unknown so far. *Chloroxylon swietenia*, *Pterocarpus marsupium*, *Albizzia lebbeck* and teak are the favourite illicit removals for carts, hut construction and agricultural implements.

94. The vast areas of paddy fields adjoining the forests are the cause for illicit removal of green leaf manure from the forests. Though they can remove on seigniorage rates of 0·16 nP. per headload and Rs. 3·12 per cent load, people resort only to illicit removal, making the subordinates' task more difficult.

95. The following statement shows the number of offences detected in the former composite Tirunelveli division up to 1956–57 and in Tirunelveli North Division, up to 1958–59, for one decade :—

Year.	*Nature of offence.*					
	Grazing.	*Felling.*	*Poaching.*	*Assault on staff.*	*Miscellaneous.*	*Total.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)
1949–50	62	771	3	..	40	876
1950–51	102	1,084	8	1	60	1,255
1951–52	97	1,002	7	2	28	1,136
1952–53	81	1,527	12	1	54	1,675
1953–54			Not available.			
1954–55	122	1,187	11	..	87	1,407
1955–56	100	1,294	3	..	55	1,362
1956–57	190	1,450	..	..	124	1,764
1957–58	49	1,084	2	..	107	1,242
1958–59	32	1,362	3	..	82	1,479

95. (*a*) *Fire.*—Every year, the outer slopes and foot hills are regularly burnt and man is responsible for this damage too. Since these areas do not get the benefit of the south-west monsoon the fire season extends from March to September, wiping out all natural regeneration, even if it has a chance to survive the summer. Repeated fires, the resulting ill-effects on the soil and the sheet erosion during the north-east monsoon have brought about a steady retrogression of the forest. The most valuable species disappear yielding place to less valuable and degraded type of vegetation, chief of which are coarse lemon and thatch grass. The oftener and severe are the fires, the happier are the grasses to extend their matted rhizomes, which successfully prevent any natural regeneration from establishing itself. Thus the vicious spiral goes on every year. Though records are maintained for the fires, it cannot be said that the figures are accurate. The following abstract of fire reports can serve as a guide to assess the extent of damage caused :—

Year.	*Sankarankoil Range.*		*Kuttalam Range.*		*Ambasamudram Range.*		*Shencottah Range.*	
	Number of fires.	*Area burnt in acres.*	*Number of fires.*	*Area burnt in acres.*	*Number of fires.*	*Area burnt in acres.*	*Number of fires.*	*Area burnt in acres.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)
1955	17	825	30	375	61	2,237	..	..
1956	13	826	21	980	48	1,731	..	..
1957	16	1,372	16	354	40	1,133	11	41
1958	11	380	11	295	44	823	2	25
1959	16	589	27	648	40	800	14	110

96. Burning by graziers for the sake of tender grass which comes up after a fire is the chief cause of fires. Graziers who take cattle from groups of villages and pen them in the upper slopes can never realise the damage they bring about indirecly to themselves. Coolies employed by minor forest produce contractors burn the forest floor to facilitate easy collection of gall nuts, etc.

97. Crown fires are unknown.

98. *Grazing.*—Prior to taking over by Government the ex-estate and ex-panchayat forests were open to browsing by goats and unrestricted grazing by cattle however, this was stopped when the Forest Department took over these forests.

99. Grazing by cattle is confined only to the outer slopes and foot hills which are close to villages. The interior regions are not utilised as the villagers do not take the trouble of penning and halting inside the forest, except on rare occasions. It is unfortunate, that the most intensely grazed areas are also the most frequently burnt areas; consequently, the evils of hardening and erosion are greatest. Theoretical grazing incidence worked for all the forests comes to about 1·2 to 4·7 acres per cow unit for different forests, but in reality it is only one-tenth of the figure.

100. *Animals.*—Monkeys consume a lot of seeds and leaf and flower buds of a variety of species. The havoc caused by the malabar squirrel to seeds of *Dysoxylum malabaricum*, *Mesua ferra*, *Aerocarpus fraxinifolius*, *Terminalia bellerica*, etc., is immense. In fuel coupes sambhur and deer do considerable damage by browsing on the tender coppice shoots, and damage to teak on the Mundanthorai plateau was so great that plantations were annihilated *en mass*. The matchwood plantations of Mundanthorai plateau were, however, saved from the ravages of sumbhhur and wild boar by the strong fence and the actual dwelling of the kumridars inside the plantations even during night. Surprisingly, there is practically no damage in the evergreen forest and over Mundanthorai plateau by elephants, though their presence is abundantly felt in Sivagiri and Vasudevanallur forests. Incidentally, elephants do immense service by eating the bark of *Acacia intsia* which is a pest in all the felled fuel coupes.

101. *Insects.*—Damage to teak plantations by *Hyblaea puera* and *Hyblaea machaeralis* is negligible, probably due to the scattered nature of the plantations. In the matchwood plantations *Ailanthus excelsa* gets badly defoliated. The Entomologist's advice to pick the larvæ by hand and destroy them did not prove practicable over plantations. In the evergreen forests, *Mesua ferrea* is barly damaged by a cerambycid, which tunnels into the stem longitudinally and radially making it unfit for anything. Almost every tree above one foot girth is riddled with tunnels.

102. *Plants.*—*Strobilanthes, Lantana Eupatorium* and lemon grass are the principal injurious undergrowth in the forests. *Strobilanthes*, by its gregarious habit, rapid growth and ability to coppice with greater vigour every time, forms a thick undergrowth choking all seedlings and coppice growth of all valuable species in the more moist areas like Mundanthorai plateau. All attempts in the past to eradicate it by making it even obligatory on the part of coupe contractors have not met with success. It appears to flower gregariously at about ten year intervals. In 1960 there was a gregarious flowering in Ambasamudram range.

103. Grass flourishes well in the fuel forests and outer slopes that suffer most from fires: its thick mat of roots prevents the seedlings of *Pterocarpus marsupium*, *Terminalia paniculata*, rosewood, etc., from establishing themselves, thereby annihilating even the little chance of improvement to the forests. Its contribution to the intensity of fires is greatest.

104. *Lantana and Eupatorium.*—Form dense undergrowth in the moist areas like Puliyara, Kuttalam and Kariar. *Ficus hispidia* sends out a mass of root suckers which effectively suppress all other species under them.

105 The harmful climbers are *Caesalpinia bonduclalla Caesalpinia mimosoides*, *Acacia intsia*, *Acacia concinna*, *Pterolobium indicum*, *Eutada scandens*. etc. These are abundant in the moist and dry deciduous forests; comparatively, climbers are rare or almost absent in the evergreen forests.

106. Fungal species are rich in the evergreen forests and their damage is chiefly to the dead trees and logs.

SECTION 3—WILD LIFE.

107. *Animals.*—Most of the game population inhabit the outer slopes and more easily accessible portions. Game in the evergreen forests is comparatively rare. On the whole there has been a steady dwindling of game year after year; nonetheless, this division is still rich in wild life, and Mundanthorai continues to be rich in big game

like tigers, leopards, sambhur, spotted dear, etc. Even on the very first day of his inspection, the writer bumped into the company of two tigers hardly four furlongs from the rest house. At one time they were so numerous that the diary farm at Mundanthorai had to be liquidated, for, the tigers took control of the farm. The advent of the jeep and the good network of roads in Ambasamudram Range were responsible for the excess of hunters. A full grown tiger of these parts seldom exceeds 8½ feet in length. After Mundanthorai, the favourite haunts of the tiger are Sivagiri, Vasudevanallur and Singampatty forests.

108. Panthers are quite common in the outr plans and foothills, thriving principal on cattle that come to graze. Occasionally people trap cattle-lifters on cultivated lands adjoining the forest and then take the captured animal over procession through villages and bazaars. This often fetches them a donation of as much as Rs. 500 from all the cattle owners in appreciation of the so-called valiant captor. Black panther is common in Sivasailam and Kuttalam forests, but fortunately its fur is not sought after.

109. Elephants are common in Sivagiri, Vasudevanallur and the evergreen forests; but very rare over the rest of the division—probably because of the absence of bamboos. Bisons are confined to the grass lands of Chinnapul, Nadupul and Periapul. Sambhur, spotted dear, mouse-dear and boar are common throughout the division; barking deer is confined to Koilteri and Kuttalam forests. Boar and porcupine are numerous and cause immense damage to seeds in the evergreen forests. The commonly called Ibex (Nilgiri Tahr) haunts the rockycliffs of Krishnapuram, Chinthamani beat, Kulirattimottai and Varaiadumottai. It is a happy state of affairs that poaching for this animal has almost disappeared.

110. Wild dogs are common all over the division, notably in Kuttalam Reserved Forest where packs of even forty animals can be seen. Their ravages are the worst. But curiously, people do not come forward to destroy this pest in spite of the handsome rewards offered. The toddy-cat which takes its abode in the ceiling of rest house is often a nuisance.

111. Apart from monkeys, squirrels, rabbits, etc., special mentioned must be made of the noctural flying squirrel which sets out at dust gliding from the tree top to the base of the next tree, climb up to the tree top and then again glides down to the next tree. Locally it is mistaken as a flying cat because of its noctural habits.

112. Otters are common in the reservoirs, Servaiar and Thambaraparni rivers. There is a family of them near the Mundanthorai bungalow.

113. The Fisheries Department is having fish farms in the two reservoirs in Ambasamudram Range. The fishing rights get a sizable revenue to that department.

114. For the Ornithologist this division offers a paradise, especially in the evergreen forests. The different species of *Eugenia* are in fruits by turn all through the year to attract birds. Wild ducks are reported to breed in one of the tanks near Kovilpatty.

CHAPTER III—UTILIZATION OF THE PRODUCE.

SECTION 1—AGRICULTURAL CUSTOMS AND WANTS OF THE PEOPLE.

115. The 1951 census reveals the population figures for the following important towns, which depend on the forest for their firewood :—

Kadayanallur	38,060
Tenkasi	31,074
Vikramasingapuram	29,361
Puliangudi	27,619
Sankarankoil	21,904
Ambasamudram	20,356
Kallidaikurichi	20,019
Sivagiri	16,612
Vasudevanallur	12,897
Shencottah	17,332

116. Besides the above, Tirunelveli town with a population of 98,866 and Palayamcottai with 73,476 also get part of their fuel supply from this division although their major requirements are brought from Tirunelveli South division forests. The main occupation of th people is agriculture, and paddy cultivation covers nearly a third of the total cultivated area. Generally though poor, the people of the district are very enterprising, hard working friendly in nature. Various kinds of cottage industries are flourishing in remote and significant villages; but most of them have not caught the attention of good markets for want of advertisement and organized marketing.

Mats and baskets of varying texture and designs made out of palmyrah leaves and fibre are peculiar to the district and there cannot be a single house without using these products. The finest quality mats are made out of korai pillu (Sedge) in the village of Pathamadai by a few Muslims who practice this art handed down from generation to generation. The fine workmanship and delicate artistic designs are so good that a mat of 6 feet by 3 feet occasionally fetches even Rs. 200. Toys, hand bags and other fancy articles are also made for local consumption.

117. The one tree which is useful all through its life from the seedling stage right up to its maturity is palmyrah which forms the bulk of the tree grown in the plains. The sap (Pathanir) tapped from the inflorescences turns into a delicate sweet drink as soon as it drips into the lime coated pot; without the lime it quickly ferments. The tapping season extends from January to June and a tree on the average yields about 3/4 Madras measure of Pathanir per day. Only a small portion of the yield is consumed locally and the rest is boiled to produce a coarse sugar called jaggery. Jaggery manufacture is an important industry of the district for which small faggots and brushwood are in great demand. The translucent endosperm in the tender fruits is much relished and supposed to have a cooling effect on the body during summer. The cotyledons and endosperm of germinating seeds are a popular food with the poorer people. The leaf stalk yields fibre for brushes and rope. The timber from mature trees is widely used for house construction on account of its durability and cheapness; it is the poor man's timber in the district.

118. The chief requirements of the people from the forest are :—

(i) Timbers for construction and industry.
(ii) Small timber for buildings and agricultural implements.
(iii) Fuel for daily use, jaggery manufacture, pottery and lime and brick-kilns.
(iv) Wood for toy making.
(v) Grazing facilities.
(vi) Thorns for fencing.
(vii) Thatch grass.
(viii) Manure leaf.
(ix) Bamboo for shades.

119. *Timber.*—Large size timber for heavy constructions is brought from Kerala and Kanyakumari district and to a small extent from the clearfelling coupe in Shencottah Range. The most popular species are teak, rosewood, *Artocarpus hirsuta*, *Hopea parviflora*, *Eugenia gardeneri*, etc.

120. There prevans a good demand for matchwood to feed the numerous amail match factories situated in this district and in the adjoinng portions of Ramanathapuram disrtict Match splints are manufactured on a cottage industry basis and then taken to the factories; the people are so skilled at it that they are able to use even neem for this. At present much of their requirements is met from Kerala under fluctuating conditions. It is, therefore, fitting that we should grow matchwood in this division to guarantee some sort of security to the industry.

121. *Small timber.*—The average person, for his thatched house or tiled buildings, goes in for palmyra wood. Those who are close to the teak forests of Vasudevanallur and Sivagiri tend to take illicit teak posts and small timber from the forest. Teak posts of six inches diameter and 10 feet long are the most sought after; though the heartwood contents of such posts may be small, the very name of teak has a special appeal to the people. Alternative species used for posts are *Cordia myxa*, *Streblus asper*, *Pterocarpus marsupium*, etc. Besides these, mango is freely used for door and windows by the midle class people.

122. The farmers' requirements for his implements are small. He uses a light wooden plough on wet lands, a slightly heavier one on dry fields, a wooden plank to level the ploughed surface, a spade for hoeing and a clod breaker for breaking up the ploughed soil. The plough consists of the plough share, handle, shaft and yoke, of which the plough share requires the most frequent renewal. Normally a plough share lasting for two years when used for wet cultivation and for a year when used for dry cultivation; on an average a farmer requires one plough share per year per acre of cultivation. The other portions of a plough generally last for three years. The following list shows the species used for different parts of a plough :—

Plough share	*Chloroxylon swietenia*, *Acacia arabica*. *Mesua ferra*, neem. Usually the tip of the plough share is fortified by an iron shoe.
Shaft	*Mesua ferrea*, *Grewia tiliaefolia*, teak.

Handie	Teak.
Yoke	*Pterocarpus marsupium*, teak, *Acrocarpus fraxinifolius Gmelina arborea*, *Terminalia paniculata*, *Stereospermum chelonoides*.

123. Bullock carts are the popular mode of transport for the average agriculturist. When the bulls are not used on the fields they are used for the carts. Usually bullock cart as it is supposed to enhance his social status in his village. The species in demand for the various parts of a cart are given below :—

Baulks	*Acrocarpus fraxinifolius*, *Hardwickia pinnata*, *Pallaquium ellipticum*, *Pterospermum rubighinosum*.
Spokes	*Aibizzia lebbeck*, *Albizzia odoratissima*, teak.
Felloes	Teak.
Shaft	*Palaquium ellipticum*, *Hardwickia pinnata*.
Wheel box	*Chloroxylon swietenia*, *Acacia arabica*, *Hardwickia binata*.

124. *Fuel*.—Fuel from the forest goes mostly to the towns either through the fuel coupe contractors or through small illicit removals. Very little of forest fuel finds its way into villages as cowdung cakes, leaves and stalks of palmyra and brushwood of other different species found in topes and waste lands meet their needs. Very poor people who are also unable to find work make their livelihood by collecting cowdung and then selling the cake. Into Shencottah and Tenkasi taluks flow large quantities of jungle wood and rubber wood from Kerala through Aryankavu pass. Wood from the numerous patta lands in Puliyara Reserved Forest and Kuttalam Reserved Forest also feed the local markets, especially in Tenkasi taluk. In the plains, near the coast, *Acacia planifrons* is widely cultivated by landowners wherever the lands is unsuitable for other agricultural crops; fuel from them is generally taken to Palayamcottai and Tirunelveli towns where it fetches a handsome price.

125. In Puliyara Reserved Forest exists a concession by which local people are permitted to collect dead fuel for domestic use. From the more accessible coupes women generally take headloads of fuel on payment of seigniorage fees to the lessee; it is a remarkable fact that in some places these women walk even 12 miles from the coupe with the fuel loads on their head. It was ascertained that a headload, after all this strain and sweating, fetches not more than a rupee. In contrast with this, illicit removal of headload of fuel by a large number of people of Sivagiri and Vasudevanallur is not uncommon in the area.

126. The small industries like jaggery manufacture, pottery and lime and brick kilns are in the hands of very poor people, who cannot afford to pay for the fuel. Therefore, they depend mostly os free fuel available on waste lands and occassionally on illicit fuel if they can.

127. *Toy making*.—In Ambasamudram town flourishes this cottage industry in which attractive toys are made at improvised turneries. The workmanship and finish of the products are so good that there is a great demand for these toys in other states, and in neighbouring Ceylon. It thrives on the wood obtained from fuel coupes and illicitly removed from Aladiyur beat. The requirements are short wooden billets of about six inches diameter, and the species favoured are *Stephegyne parvinora*, *Adina cordifolia* and rosewood.

128. *Bamboos*.—The standing stock of bamboo in the division is very little and its use is also limited since palmyra leaves and posts are readily available. However, the town population is shy of using palmyra leaves and posts and generally patronise bamboos. Most of the bamboos come from Kerala and Kanyakumari district. Some bamboo is found in Kuttalam Range, Puliyara Reserved Forest and Vadagarai Melpidagai Reserved Forest. This will be exploited under a working circle. Bamboo is mainly used for screens, sheds, pandals and baskets.

129. *Eta reeds*.—This produce is now extracted on a very insignificant scale as a minor forest produce through contractors who either collect in large quantities and despatch to towns like Tuticorin or give it on headloads for local consumption. By this method about 70 tons of reeds are extracted annually and cutting is confined to the easily accessible portions above Kuttalam and Sivasailam. Stock mapping of the reed areas by the Forest Engineer in 1925 revealed that there were about 28 equare miles of reed in the division. Hitherto no interest has been shown on this excellent raw material for high quality paper in spite of the Punalur Paper Mills not far away from Shencottah. Of late, industrialists are exploring new avenues for expansion and it is hoped that this will result in a paper mill being established.

130. *Manure leaf.*—Demand for green manure leaf exists in Ambasamudram, Tenkasi and Sankarankoil taluks where the principal cutlivation is paddy. Manure leaf removed on payment of seigniorage fees is annually about 300 cart loads. The principal species preferred are *Sida rhomboidea, Lannea grands, Mundulea suberosa, Thespesia lampas, Phyllanthus emblica,* etc. Peak demand is from July to October.

131. *Grazing.*—Cattle from villages close to the forest are taken into the forest by community graziers and brought back in the evening covering as much as ten times per day. Thus they get hardly two or three hours to graze in the forest and this accounts for their poor condition. Interior and richer parts of the forests are never grazed and all the grazing is confined to the outer slopes below 500 feet. Due to concentrated grazing and repeated fires the quality of grass has reached its lowest level; therefore to stimulate palatable tender shoots out of the coarse grass, frequently graziers set fire to the forest during the summer. This fire sweeps over the steep slopes and kills all vegetation up to the 1,500 feet level where the semi-evergreen and evergreen vegetation begin to appear. If the villagers take to penning liberally, this evil may probably come down. Closing such fire burnt areas to grazing is not a solution either, for, the area burnt is hundred times more than the area on which cattle would graze and it is difficult to exercise vigilance. Probably it is an evil we will have to put up with, for ever.

132. In Shencottah taluk, which was under Kerala State, grazing was free; this anomaly has now been set right by enforcing the same grazing fee as it prevails over the rest of the State, in G.O. Ms. No. 3684, Food and Agriculture, dated 5th December 1957. The grazing year coincides with the fasli year beginning from 1st July. During the rainy season, i.e., in October to December, when fields are with standing crops cattle make greater use of the forest. The following table shows the grazing compartments into which the forests stand divided :—

Name of reserve.	*Acre open to grazing.*	*Acre allowed in 1957–58.*	*Number of cow units allowed.*	*Grazing incidence as acres per cow.*
(1)	(2)	(3)	(4)	(5)
T. N. Puthukudi	1,986	1,986	422	4·7
Sivagiri	14,400	12,175	4,578	2·65
Vasudevanallur	20,309	18,899	5,565	3·39
Krishnapuram	2,830	2,306	1,124	2·05
Chokkampatti	3,000	3,000	167	17·9
Vairavankulam	4,500	4,500	829	5·43
Kadayanallur	4,460	3,999	2,130	1·87
Kuttalam	5,450	4,921	3,938	1·25
Uthumalai	3,472	3,266	2,409	1,36
Sivalarkulam	1,411	1,176	716	1·64
Papanasam	26,190	22,618	9,636	2·27
Singampatti	17,307	16,566	648	25·56

133. The grazing incident comes to nearly three acres per cow unit; but actually this will be much less since many of interior portions are never visited by the cattle.

134. Stall feeding is practically unknown.

135. *Minor forest produce.*—The main items of minor forest produce are gall nuts, honey, wax, tamarind, cardamom, Irdukodi, thatch grass, reeds, nellikai, damar, etc. In order to increase the field of competition and to attract the smaller contractors the ranges are divided into smaller units called farms. These products, generally are seasonal and lie scattered far and wide rendering collection and transport difficult and expensive. Contractors who generally have labour force under their command are able to divert them for this purpose when they are not required in the plains. Except for a few items of these products, most of them, especially the medicinal herbs, are sent to Kerala. The Paliyars, a hill tribe in Sivagiri and Vasudevanallur forests, come in very useful to collect most of the minor forest produce but the tendency on the part of contractors to over-exploit their innocence has often discouraged collection and revenue to the department.

136. Honey was collected departmentally in 1958 and 1959 under orders of Government; but from 1960 this was given up since it proved uneconomical and unremunerative. Once again this produce is being collected through the agency of contractors.

137. *Cardamom.*—In gaps created by windfalls and over-fellings in the evergreen forests cardamom comes up naturally. Sold as an item of minor forest produce, this has been fetching a handsome revenue every year. Generally, the lessees for natural cardamom are also the neighbouring estate owners, who offer high prices in order to shut out new comers and possible pilfering from their own estates.

138. The cardamom estates inside the reserved forests are controlled by regular longterm lease deeds executed with the cultivators. But the status of cardamon estates in Sivagiri ex-zamin forest is placed before the stelement court for a decision.

139. Cardamom grows well between 3,000 feet and 4,000 feet under a high evergreen overhead shade, where the rainfall is above 120 inches. Gentle well drained slopes, shielded from strong winds, an overhead canopy of 0.8 density and a well distributed raifall all through the year are the requirements of cardamom. It does not tolerate erosion, excessive shade or opening, and badly suffers if there is no rain in January to March. The best yield is got from eastern slopes and the poorest from western and south-western slopes exposed to the strong gales. The plant yield from the third year and continues up to the twelth year or a little more; thereafter the yield is not economical. Yield varies from 60 to 180 ponuds per acre, per year. Hundred pounds of green fruits when dried weigh 30 pounds. The selling price at auctions is Rs. 9 per pound.

140. A lessee who take up an acre for cardamom planting pays a premium of Rs. 200 to Rs. 400 per acre and thereafter an annual rental of Rs. 7.50 N.P. for lease period of 25 years. The underwood and all undergrowth are cleared, some of the overhead trees are also removed until the canopy comes to 0.8 density. Pits of one or two foot cube are dug, the top soil put back into the pit and in each pit one or two cardamom slips are planted. The spacing adopted varies from 6 feet square to 12 feet square. For three years after planting, the cardamom plants are literally ignored—not even a weeding is given as the weeds protect the plants and prevent soil erosion. If the top soil is washed off, cardamom dies. From the third year onwards the cardamom plants are weeded at the base during the rainy season to reduce the dampness. During summer and when there is no rai weeds are retained at the base to protect the rhizomes from heat and sun. Periodically, once in four or five years, as the overhead trees close up, here and there some trees are cut down to bring the density back to 0.8. Fruits are plucked on a cycle of three weeks and air dried and special driers built within the estate. The produce is sent to Pattiveerampatti where it is pooled with the cardamom of Madurai district and exported to other countries.

141. The stock is usually replaced after 12 to 15 years since the yield deteriorates. Experiments have just been started to study the effect of fertilisers as an alternative to replanting. The cardamom estates in Walayar generally suffer from a severe fungus attack which rots the rhizome, inflorescence and stem. Defoliators, thrips, etc., are the chief enemies, which are successfully combated. Each estate has its own labour force, quarters for them, a drier and all equipment.

142. More suitable areas are available in the evergreen forests and it will be worthwhile to lease them out for cardamom since no damage to the forest results. Such of the areas that are suitable for cardamom cultivation have been marked in the respective working plan maps.

143. *Cinnamom Barks.*—Quality of this is definitely inferior to that of *Cinnamomum zeyylancium* since the species found in the evergreen forest are *Cinnamomum gracile* and *Cinnamomum iners*. Still locally this bark is in great demand and fetches an appreciable amount. Supervision and control of bark stripping in the scattered and interior forests is difficult and the lessees have a tendency to damage the trees. To mitigate this, the bark is extracted on a five year rotation, with certain restriction on the method and size of the trees to be debarked.

144. Thatch grass and fencing material are removed in head loads under head load permits. Near Sivasailam and Govindaperi lemon grass oil is distilled on a cottage industry scale with the help of improved stills. Into each still are loaded 500 pounds of green grass, water is poured till it stands nine inches above the grass and then the containers are boiled for 4 or 5 hours and distilled. This yields 24 oz. of oil valued at Rs. 4. Generally they take three shifts per day with three stills at a place. On an average a family can produce about Rs. 12 to Rs. 36 worth of oil. The oil contents are believed to be greatest between June to January and more in grass growing on the plains and outer slopes. In spite of the handsome dividends from this industry the local people have not learnt to develop this potential; the work is now in the hands of a few enterprising people from Kerala.

SECTION 2—MARKETS AND MARKETABLE PRODUCE.

145. Being only small in quantity, all the timber extracted from the division (mostly from the timber-*cum*-fuel coupes) is consumed locally in the district itself. Since this quantity is insufficient timber from Kanyakumari district and Kerala also finds its way into this district. Of late investment in houses in towns has increased considerably: the numerous colonies under construction and the general lack of popularity for reinforced concrete structures have increased the timber demand to a large extent. *Hopea parviflora* is the most popular timber for house construction in this district. Considering these conditions it is reasonable to expect a keen demand for the evergreen timber to be extracted from the sholas of the division. The road leading to the evergreens does not facilitate the transport of large size timbers, a fact which necessitates sawing into smaller sizes and thereby reducing the field of utility. Teak continues to be the most expensive timber, a 20 feet pole with 24 inches girth at breast height costs Rs. 25 in Tirunelveli.

146. Fuel extracted from Ambasamudram and Kuttalam ranges is consumed locally in the district itself. About half of the fuel from Sankarankoil and Shencottah range is taken to Madurai while the other half is marketted at Koilpatti and Rajapalayam. Contractors find it quite profitable to transport fuel over long distances by diesel lorries as the fuel price in towns is as much as Rs. 55 per ton. Even feling refuse and chips from fuel coupes packed in gunny bags find a ready market. There is a keen demand for rough dressed cart sopkes and felloes and most of it is supplied from depots in towns and villages by the coupe contractors.

147. There is a good demand for sandalwood in Virudhunagar, Sivakasi and Krishnapuram by the agarpathi manufacturers who get their requirements either from the Tirupattur depot or by illicit means from Ramanathapuram division. It will be to the interest of the department to sell in auction at Srivilliputtur all the Sandalwood extracted in Tirunelveli and Ramanathapuram districts. A small quantity of sandalwood annually extracted from Kuttalam Reserved Forest is sent to Srivilliputtur Sandalwood depot of Ramanathapuram division for onward despatch to Tirupattur.

148. The quality of rattan canes extracted is comparable with that of Malabar, and most of them are absorbed by the furniture industry in Kanyakumari district. All the reeds collected are consumed in the district itself by the basket manufacturing industry.

149. Among the other minor forest produce, honey and wax are consumed entirely by the local people. All the herbs, barks, resins, Nellikai, etc. are sent to Kerala for ayurvedic medicines since this system of medicine has not developed at all in this district in spite o fits close ties with Kerala State. The bark of *Acacia intsia* is in great demand in Kerala as a bath brush, while the stem is widely used in the district as a brush for white washing. All the gallnuts and avaram bark go to feed the tanneries in Dindigul.

SECTION 3—LINES OF EXPORT.

150. This division is served by a good network of roads both inside and outside the forest. This is supplemented further by the metre gauge lines of the Southern Railway:—

(i) The Viridhunagar-Tenkasi Chord line.

(ii) The Tenkasi-Quilon line.

(iii) The Tirunelveli-Ambasamudram-Tenkasi line.

151. The trunk road from Madurai to Tenkasi connecting Rajapalayam and Kadayanallur is joined by the Tirunelveli-Ambasamudram-Tenkasi highway. This road running almost parallel and close to the foot hills of the division is an impetus to the efficient and through working of the forest. Besides there are several second class roads and cart tracks leading to the forests.

152. The Aryankavu and Achankoil gaps have greatly influenced the district by putting its people and trade in close association with those of Kerala State. Almost all the flow of merchandise finds its way through these gaps.

153. The entire timber and fuel are transported only by lorries to the various towns as the contractors find it cheapest and quickest.

154. With a view to supplying cheap timber, in 1929 the evergreen forests were opened out by a series of roads and bridle paths. About 45 miles of paths in Kodamadi and 30 miles of paths in Kanikatty were constructed at a cost of Rs. 1,118·56 to facilitate stock-mapping. Later on this scheme was abandoned with the result most of them except those paths leading to the rest houses got obliterated by the evergreen growth.

SECTION 4—METHODS OF EXPLOITATION AND THEIR COST.

155. All major and minor produce (except sandal and honey) are extracted through the agency of contractors, who with nearly 50 years of experience and enormous resources in men and material have set up a high standard. The principal contractors are the Rajas of Rajapalayam who consider it a great honour to take forest leases both to maintain their workmen and to keep up the tradition; and the annual coupe auction sale is so popular that it is almost like a festival for them.

156. The fuel coupes are sold in January or February with the lease period running from April to March or to a shorter period of only nine or six months should the coupe be smaller. For this purpose the coupes are surveyed and demarcated on the ground sometime in December-January, according to the working plan map and divided into three or four strips. The lessee, after satisfactorily completing work in one strip, is allowed to begin work in the next one provided the pays up all dues to the department. All removals from the coupe in head loads or cart loads, etc., are covered by permits issued by the lessee or his authorised agents, who render to the range officer monthly accounts of permits and yield from the coupe. In Shencottah range, where the clear-felled coupe are to be planted with teak, the lessee is made to heap and burn the area before he vacates the site; but this condition has never worked well as it is imposssible to enforce this condition without affecting the time schedule set for regeneration works. Therefore, this condition will not be prescribed.

157. In coupes where the lessee is not obliged to leave any burshwood for regeneration works, it is readily removed on heads by the villagers at 0·12 nP. per load covered by a permit. In the past this kind of removal went to supplement the agricultural income and to meet the domestic requirements; but of late it has become the sole living of villagers who sell the fuel in towns walking even 12 miles a day. At any rate, the lessee and his agent are only too happy to find this demand and often to encourage this, people are given a free lift in lorries to the coupe. On an average a lessee earns Rs. 5 to Rs. 10 per day by sale of head load permits.

158. There are no areas now being worked solely for timber. Such of the timber available in clear-felling coupes is removed by the lessee after it is hammer marked by the Range Officer or a Forester. Bent and unwieldy logs are sawn into spokes, felloes and plants from within the coupe and then transported. Generally logs of *Gyrocarpus* are dressed and kept ready for the villagers, who use the dug out logs as piccotals and pay as much as Rs. 3 a cart load.

159. Timber from the evergreen forests extracted during 1929 to 1948 was sold standing to the contractors except on rate occasions when the department undertook all the operations. Generally, departmental extraction and transport have never been smooth and for this reason in some divisions the work of felling, and transport to the government depot of standing trees is got done successfully through contractors after inviting tenders. There was no classification or grading of timber in this division till now.

160. The minor forest produce is sold in June and the lease period runs from July to June. In view of the seasonal and scattered nature of these products no contractor employs permanent labour for collection; he either allows the consumers or their men to collect on head load tickets with a voidah of one day or himself employs men and pays them according to the quantity and quality of the produce collected. When payment is made according to quantity, the collecting agent is usually given about a fortnight's voida hfor his tcket to enable him to go and halt inside the forest. The Paliyars in Sivagiri forest are a great help to collect minor forest produce.

161. *Cost of collection.*—In fuel coupes, the works of felling, billetting, loading and transport to the lessees depot in town are not done by the lessee himself as one might expect; instead he gets these work done on contract. Extraction paths and roads are laid out by the lessee at his own cost which at times goes to Rs. 10,000 for difficult coupes. For purposes of payments to the feeling contractor, a lorry load is taken as 4 tons; during rainy season a lorry can take only 3 tons; but this is compensated in the non-rainy season. The felling contractor employs about six axe-men, a dozen ordinary labourers and about 20 women. Dragging of large pieces is done by the men, while the work of carrying the billets to and stacking near the loading site within the coupe are

done by the women. The rate paid for felling, billetting and transporting inside the coupe and loading into a lorry is Rs. 18 for one lorry load of four tons. Transport from coupe to the lessee's depot in town is done either by his own lorries or that work is also given on contract which is generally Re. 1 per mile for a lorry load :—

	PER TON.	
	RS.	nP.
Cost of felling, billetting, moving to lorry site and loading at Rs. 18 per lorry.	4	50
Transport by lorry from Padarmalai to Ambasamudram at Rs. 28 per lorry load of 4 tons for 60 miles to and fro.	7	00
Unloading at depot	0	50
Loading into lorry	1	00
Transport by lorry from Ambasamudram to Tirunelveli over 25 miles at Rs. 25 per load of 5 tons.	5	00
Unloading and weighing at Tirunelveli	1	00
Overhead charges	1	00
Total ..	20	00

162. The average cost of exploitation and transport to Tiruenlveli town from Ambasamudram Range is Rs. 20 per ton. This rate is likely to be a little less wherever the coupes are closer and nearer to the towns and main road. The average selling price of fuel at Tirunelveli is Rs. 48 per ton.

163. Wages paid by the contractor to his workmen are as follows :—

	RS.	nP.	
Axe-man	2	50	per day.
Man	1	50	,,
Woman	0	75	,,
Agent	50	00	per month.

164. Reeds are collected in head loads of 30 each at Re. 1 per head load. On an average a person collects and transports 100 reeds in a day and earns Rs. 3. Rates paid to collecting agents for other items of minor forest produce are as follows :—

	RS.	nP.	
Cardamom	2	00	per lb. dried.
Honey	3	00	per Madras Measure.
Damar	0	30	per lb.
Avoram bark ..	0	09	,,
Acatia intsia bark ..	0	15	,,
Turmeric	0	12	,,
Phyllanthus emblica.	0	06	Madras Measure.
Cassia fiotula bark ..	3	75	100 lb.
Terminalia chebula ..	0	12	per lb.
Tamarind	0	21	,,
Canes	2	50	100 canes.
Bamboos of 9 feet length.	15	00	,,
Reeds (lead 6 miles) ..	3	00	,,
Small canes (lead 8 miles).	3	00	,,
Large canes (lead 8 miles).	8	00	,,
Basket canes (lead 8 miles).	2	50	,,

165. *Sandal.*—This is extracted only in Kuttalam Range where it grows to a fair size. The extracted wood is despatched to the final cleaning depot at Srivilliputtur of Ramanathapuram division from where the final cleaned wood is sent to Tirupattur sale depot. The particulars of extraction are given below :—

Year.	*Quantity.*					*Cost of extraction.*
(1)	(2)		(3)			(4)
	T:	CWT.	QR.	LB.	OZ.	RS.
1954–55	0	0	19	10	6	..
1955–56	0	14	0	21	8	..
1956–57	0	8	2	11	0	13·00
1957–58	0	7	19	19	9	5·50

SECTION 5—PAST AND CURRENT PRICES.

166. Keeping pace with the country's economy, the prices of all forest produce have gone up by several times over the prices of the nineteen thirtees. There has been a second rise in prices since 1951 along with the increase in cost of living. The two items of forest produce over which the price factor has been felt are the universally used firewood and timber. Some 25 years ago, the selling price of good teak timber was Rs. 6 per cubic foot and of fuel was Rs. 12 per ton; but ironically at that time that was considered very high and expensive. The present selling price of teak timber at Tirunelveli is Rs. 25 per cubic foot and for fuel it is Rs. 48 per ton. Prices near source of supply are generally less, as can be seen from the cost of firewood prevailing in other towns :—

	PER TON.		PER TON.
	RS.		RS.
Rajapalayam	40	Vasudevanallur	35
Srivilliputtur	40	Ambasamudram	40
Madurai	50	Sivagiri	33
Koilpatti	40	Tenkasi	38
Kallidaikurichi	38	Tirunelveli	48
Shencottah	30		

167. The demand for fuel is bound to continue or even increase unless we are able to find alternative materials like oil or lignite at a reasonably cheaper price. Even now, use of kerosene oil for the kitchen is certainly cheaper than firewood due to numerous brands of burners and stoves put in the market, which do not cost more that Rs. 11 each and serve for about a year. Unfortunately the number of people who use these is too very insignificant to relieve the strain on the fuel supply.

168. Current prices of various timber species are given below :—

Species.	*Unit per*	*Prices at places in rupees.*		
		Kadayanallur	*Tirunelveli.*	*Krishnapuram.*
(1)	(2)	(3)	(4)	(5)
Pterocarpus marsupium	C. ft.	3.25	4.00	3.00
Albizzia lebbeck	C. ft.	3.25	4.25	3.00
Teak—Above 6 feet girth	C. ft.	22.00	25.00	22.00
Three to six feet girth	C. ft.	16.00	19.00	16.00
Below 3 cft. girth	C. ft.	6.00	8.50	6.00
Grewia tiliaefolia	C. ft.	2.25	--	2.25
Hopea parviflora	C. ft.	7.00	9.00	7.00
Rosewood..	C. ft.	12.00	16.00	12.00
Adina cordifolia	C. ft.	5.00	--	4.00

169. The evergreen forests were given rest in Mr. Cariappa's working plan, though they were exploited in previous years. The trees were sold to the contractors standing; but many a tree was substituted by unmarked trees for reasons of hollowness, etc. The average price per tree obtained is given in the following table :—

Year of working.	*Locality.*	*Number of trees felled.*	*Revenue per tree.*
(1)	(2)	(3)	(4)
			Rs.
1929–31	Kannikatti	311	12.72
1932	Kannikatti	151	5.30
1932	Kodamadi	159	8.17
1933	Kannikatti	138	6.25
1934–35	Kodamadi	401	11.00
1935–36	Kodamadi	403	7.12
1937–38	Kannikatti	270	11.00
1939–40	Kannikatti	303	10.25
1940–41	Kannikatti	323	13.94
1942–43	Kannikatti	215	38.00
1943–44	Kodamadi	181	74.00
1944–45	Kodamadi	98	183.00
1945–46	Kodamadi	389	166.00
1946–47	Kodamadi	219	160.00
1947–48	Kodamadi	119	160.00
1948–49	Kodamadi	44	160·00

170. The general prices at which various minor forest produce are sold are as follows : —

	RS.	NP.	
Charcoal	4	50	bag of 82 lb.
Small canes	3	50	100 canes.
Cardamom	5	00	per lb.
Honey	8	00	per Madras Measure.
Turmeric	0	25	per lb.
Dammar	0	55	,,
Phyllanthus emblica	0	20	per Madras Measure.
Gallnut	0	25	per lb.
Tamarind (seedless)	0	80	,,

Statement showing prices per acre obtained for Clearfelled Coupes from 1947.

Name of felling series.	1947–48		1948–49		1949–50		1950–51		1951–52		1952–53	
	Coupe.	RS.	*Coupe.*	RS.	*Coupe.*	RS.	*Coupe.*	RS.	*Coupe.*	RS.	*Coupe.*	RS.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)
Koraiar	XVI	110	XVII	220	I	200	II	385	III	351	IV	401
Govindaperi	XVI	73	XVII	105	I	131	II	201	III	200	IV	371
Koilteri	XVI	240	XVII	361	I	256	II	463	III	575	IV	595
Sivasailam	XVI	500	XVII	211	I	121	II	385	III	375	IV	331
Ambur	XVI	190	XVII	106	I	75	II	260	III	280	IV	291
Padarmalai	XVI	500	XVII	301	I	201	II	230	III	300	IV	637
Chinnakadu	XV	226	XVI	330	I	185	II	324	III	313	IV	487
Kadayanallur	XV	385	XVI	151	I	112	II	170	III	310	IV	301
Kuttalam	XV	601	XVI	401	I	253	II	390	III	423	IV	379
Mathalamparai	..	..	XV	311	I	136	II	292	III	251	IV	362
Vasudevanallur	XV	400	XVI	229	I	177	II	200	III	370	IV	811
Karuppasamikoil	XV	420	XVI	176	I	126	II	335	III	460	IV	309
Puliangudi	XV	326	XVI	156	I	41	II	129	III	251	IV	556
Vadagarai Melpidigai ..	..	..	..	..	..	..	..	..	..	1,875	..	1,201
Kombaiar	..	..	..	..	..	..	..	..	..	..	..	..
Pachiammankoil ..	..	..	..	..	..	..	..	..	..	..	..	..

Name of felling series.	1953–54		1954–55		1955–56		1956–57		1957–58		1958–59	
	Coupe.	RS.	*Coupe.*	RS.	*Coupe.*	RS.	*Coupe.*	RS.	*Coupe.*	RS.	*Coupe.*	RS
	(14)	(15)	(16)	(17)	(18)	(19)	(20)	(21)	(22)	(23)	(24)	(25)
Koraiar	V	301	VI	137	..	..	VII & VIII	86	IX	181	X	138
Govindaperi	V	315	VI	260	VII	150	VIII	192	IX	93	X	140
Koilteri	V	506	..	..	VI & VII	400	VIII	442	IX	600	X	700
Sivasailam	V	501	VI	175	VII	172	VIII	126	IX	185	X	260
Ambur	V	162	..	..	VII	133	VIII	60	IX	106	X	69
Padarmalai	V	726	VI	417	VII	306	VIII	471	IX	898	X	905
Chinnakadu	V	265	VI	220	VII	124	VIII	179	IX	100	X	132
Kadayanallur	V	236	VI	260	VII	155	VIII	191	IX	350	X	350
Kuttalam	V	566	VI	342	..	..	..	..	..	..	..	..
Mathalamparai	V	361	VI	242	VII	192	VIII	272	IX	450	X	412
Vasudevanallur	V	319	VI	189	VII	180	VIII	275	IX	456	X	380
Karuppasamikoil	V	206	VI	293	VII	240	VIII	661	IX	516	X	604
Puliangudi	V	558	VI	450	VII	454	VIII	454	IX	730	X	903
Vadagarai Melpidigai ..	..	671	..	2,122	..	1,686	..	1,570	..	..	..	1,830
Kombaiar	X	70	VII	156	V	115	IV	169	III	81	II	36
Pachiammankoil	XVI	8	XXI	40	I	81	II	90	V	162	VI & VII VIII	61

STATEMENT SHOWING PRICES REALISED FOR MINOR FOREST PRODUCE FROM 1947-48 TO 1958-59.

Name of lease unit. (1)	1947-48 (2) RS.	1948-49 (3) RS.	1949-50 (4) RS.	1950-51 (5) RS.	1951-52 (6) RS.	1952-53 (7) RS.	1953-54 (8) RS.	1954-55 (9) RS.	1955-56 (10) RS.	1956-57 (11) RS.	1957-58 (12) RS.	1958-59 (13) RS.
1 M.F.P. except tamarind in Vasudevanallur Reserve Forest Farm I.	300	310	300	620	1,090	550	625	626	700	703	676	675
2 M.F.P. except tamarind in Farm II—Krishnapuram.	275	256	240	400	510	255	150	250	221	216	235	..
3 M.F.P. Farm III in Kadayanallur, Vadagiri, Melpidagai Kilpida and Chinnakadu.	905	1,000	1,150	1,275	1,600	415	525	460	469	470	921	..
4 M.F.P. Farm IV—Kuttalam.	1,200	1,261	1,250	1,000	1,540	855	755	766	400	428	..	..
5 Reed and Rattan—Farm I Vasudevanallur.	820	205	205	260	350	505	427	430	..	101	105	107
6 Reed and Rattan—Farm II and III in Krishnapuram and Kadayanallur.	3,356	2,001	1,500	1,500	1,510	1,015	757	725	515	635	..	..
7 Reeds and Rattan—Farm IV in Vadagarai.	1,750	1,510	815	1,401	800	1,106	..	201	225	177	231	..
8 Reed and Rattan—Farm Kuttalam.	4,001	3,001	2,527	2,500	2,530	2,510	..	781	1,000	1,550	..	..
9 Tamarind—Farm I Vasudevanallur Reserved Forest.	213	177	150	600	735	250	132	246	256	245	55	170
10 M.F.P.—Farm II Karaiar Section.	310	396	550	1,125	1,550	1,305	710	1,697	1,970	..	..	..
11 Gallnuts—Blocks I, II of Papanasam.	..	141	101	..	..	..	..	..	..	..	..	..
12 Reed and Rattan—Farm I Papanasam.	709	700	751	1,655	2,100	2,450	1,285	..	78	..	..	..
13 Reed and Rattan—Farm II Karaiar.	..	505	202	1,526	2,600	3,510	855	306	301	..	..	..
14 Usufructs of Palmyrah—Papanasam Block I.	86	201	121	205	120	121	110	110	115		..	..
Avaram bark of Kuttalam Range Reserved Forest.	65	62	..	40	66	62	65	21	26	51	..	..

16 M.F.P. except cardamom and Palmyrah usufructs in Papanasam Reserve Forest.	301	934	1,859	2,250	3,500	1,041	1,010	1,525	1,900	..	..	..
17 Manure leaves in Sivagiri Forests.	..	..	..	..	135	400	480	410	..	..	..	..
18 Tamarind in Sivagiri Forests.	..	..	..	..	40	35	35	20	40	35	..	44
19 Palmyrah usufructs in Sivagiri Forests.	..	..	..	..	41	30	..	..	25	22	25	30
20 Minor Forest produce in Sivagiri Forests.	..	..	..	..	1,600	530	400	510	1,510	525	601	560
21 Avaram bark in Sivagiri Forests.	..	..	..	..	324	..	..	216	200	..	208	..
22 Avaram bark in T. N. Pudukudi Forest.	..	..	..	..	40	..	..	..	..	..	..	..
23 M.F.P. in T. N. Pudukudi Forests.	..	..	..	..	25	28	28	29	33	42	45	41
24 M.F.P. in Vairavankulam Forests.	..	..	..	..	1,680	1,200	510	431	550	625	610	..
25 M.F.P. in Chokkampatti Forest.	..	..	..	..	70	73	31	38	51	51	..	..
26 Euphorbia bark in Uthumalai Forest.	..	..	..	..	45	..	..	20	..	21	..	..
27 Palmyrah usufructs in Uthumalai Forest.	..	..	..	..	4	..	..	10	..	13	..	..
28 Manure leaves in Uthumalai Forest.	..	..	..	..	18	..	..	..	..	..	..	..
29 Sundaikai in Uthumalai Forest.	..	..	..	..	485	375	301	320	340	..	250	..
30 Stone quarry in Chokkampatti Forest.	..	..	..	..	..	65	..	..	..	..	..	..
31 Cinnamon bark of Ambasamudram Range.	..	..	7,100	10,810	..	..	..	..	..	..	..	..
32 Cinnamon bark of Kuttalam Range.	..	..	..	2,200	..	..	..	..	..	..	..	..
33 Wild cardamom of Ambasamudram Range.	..	..	..	2,010	5,010	5,010	2,510	8,009	2,101	..	..	..
34 Avaram bark—Vasudevanallur Reserve Forest.	..	..	..	..	..	..	65	55	60	..	60	..
35 Rattan in Kuttalam Range.	..	..	..	..	..	..	..	..	1,425	..	..	..
36 Lemongrass in Kuttalam Range.	..	..	..	..	..	..	..	..	..	..	20	..

CHAPTER IV—STAFF AND LABOUR SUPPLY.

SECTION 1—STAFF.

171. The establishment of the division as at present is given below :—

Cadre. (1)	*District Forest Office.* (2)	*Ambasamudram Range.* (3)	*Kuttalam Range.* (4)	*Sankarankoil Range.* (5)	*Shencottah Range.* (6)
District Forest Officer	1	..	..	..	..
Range Officers	..	1	1	1	1
Foresters	..	4	3	2	3
Foresters on special duty	..	1	1	1	1
Beat Guards	..	14	15	10	10
Beat Watchers	..	14	15	10	10
Guards on special duty	..	1	1	4	2
Watchers on special duty	..	2	..	..	1
Bungalow watchers	..	1	1	..	..
Office watchers	1	..	..	..	..
Head Clerk	1	..	..	..	..
Accountant	1	..	..	..	..
Lower Division Clerks	6	2	1	2	1
Draughtsman	1	..	..	..	..
Typist	1	..	..	..	..
Jeep driver	1	..	..	..	..
Peons	4	1	1	1	1

172. Whenever the Forest Guards' Training School is opened (for six months) additional staff consisting of two Rangers, one lower division clerk and two peons are sanctioned for the duration.

173. A full account of the ranges and beats into which the division is divided is found in Chapter I of this Working Plan. The original Ambasamudram Range in 1921 was bifurcated into two ranges called Kodamadi and Kannikatti with Ambasamudram is headquarters; then again from 1st October 1933 the two were amalgamated into one Ambasamudram Range. Prior to 1951, Kuttalam Range consisted of only reserved forests in Sankarankoil and Tenkasi taluks; but, when the estate forests of Sivagiri, Uttumalai, Vairavankulam and Chokkampatti and the Kottamalai Panchayat Forests were taken over by the department. it became unwidely; and this led to the carving out of a new range called Sankarankoil Range from 14th October 1953 as sanctioned in G.O. No. 3880, Development, dated 27th August 1953. With the countrywide reorganisation of States, Kanyakumari and Shencottah taluks were added to Madras State on 1st November 1956. Consequently, to the already existing three ranges of Ambasamudram, and Kuttalam and Sankarankoil was added to Shencottah Range and the four ranges together were formed into a new Tirunelveli North Division in G.O. Ms. No. 2987, Food and Agriculture, dated 21st December 1956.

174. *Forest guards.*—The existing distribution of beats has worked satisfactorily without complaint. However, there is an anomaly in Shencottah range wherein beats like Vellakaltheri, Mekkarai, Mulagarchan Parai and Knanupuli have two forest guards, instead of a guard and a watcher. As the other extreme, in Thondi beat of Shencottah range there is only a forest guard. It is high time these anomalies are set right and Shencottah range is integrated and brought in line with the general set up of the department. It is suggested that the four posts of duplicate forest guards be abolished in the four beats and at the same time five posts of reserve watchers be sanctioned for the five beasts.

175. *Foresters.*—The sanctioned strength of 15 foresters has been adequate so far. However, this may not continue to be so under this Working Plan in view of the new teak plantation series to be started near Mundanthorai.

176. *Rangers.*—In spite of the compactness of the Division, the ranges have not been constituted in an equitabl manner. With an area of 9,028 acres wer have a Shencottah range, whereas 28,050 acres of Singampatti forest inspite of their importance

are not given the status of even a section. It is suggested that Kuttalam and Shencottah ranges should be amalgamated into one Kuttalam range with headquarters at Kadayanallur as at present. As a corollary, the entire Singampatti forest falling under Tirunelveli South division and Tiunelveli North division and covering an area of 54,732 acres can with advantage, be constituted into a separate range to be called Singampatti range with headquarters at Manimuthar, where enough number of buildings have been handed over to the Forest Department by the Electricity department. This readjustment not only does not involve any extra staff but greatly increases administrative convenience and produces a normal sized homogenous range with all facilities.

177. *Establishment.*—As an important division yielding considerable revenue from leases, it will be worthwhile examining whether the lease seat can be placed under the charge of an upper division clerk in the District Forest Office. The benefits derived by greater efficiency and better maintenances of control records, etc., will more than offset the extra expenditure of a few hundred rupees per year.

SECTION 2—LABOUR SUPPLY.

178. There has been no difficulty in getting labour for forest works executed departmentally or through contractors; during harvest and sowing time in the plains labour may feel shy to leave the fields and take up forest works but generally this is overcome by recruiting labour from non-agricultural zones. Most of the sawyers employed in fuel coupes are from Rajapalayam, who have been in the profession for decades and it is no exaggeration to say that they are the best in these parts. In the fuel coupes labour is so well organised by all the longstanding contractors that year after year the same men and women come to work and do not try to seek employment elsewhere: generally, they live inside the coupes under temporary sheds, making weekly visits to their villages. Wages per day paid to labour are as follows :—

	RS.
Axemen	2·50
Carpenter	3·00
Sawyer	3·00
Unskilled men	1·50
Unskilled women	0·75
Unskilled boys	0·75
Mason	2·75

179. To keep the labour in good humour, the coupe agents render all assistence by getting them their requirements of rice and vegetables periodically.

180. *Hill Tribes.*—The impact of Hill Tribes on the forests, which was great at one time is now favourable to the department: but unfortunately their number has dwindled. The two Hill Tribes in the division are the Kanis and Paliyars.

181. The Kanis, of whom there are about two hundred are migrants from Travancore centuries ago and are now distributed over Singampatti forest, Kannikatti, Upper Dam and Kodamadi. When and how they came to settle down in the hills is obscurs; but it is reasonable to suppose that the Kanis are a vestige of the frequent incursions that the Travancore rulers made into this district from the fifteenth to the eighteenth centuries through the Kattalamalai pass. This is further supported by the fact that Cheranmahadevi (Sermadevi) itself was under Chera rule at one time, and the fort at Pandayankottaimalai (a misnomer) over Mundanthorai plateau must have served as a place of refuge to the infiltrating men. The Kanis maintained their allegiance to the former rulers by taking presents of a special variety of bananas, tapioca, etc., to them, whenever they toured in the neighbouring territory across the border. They are a simple and straightforward folk who thrive principally on tapioca, bananas, etc. Their settlements, which they call " Vadis ", consist of huts made of reeds, grass and brushwood, and are situated, as a rule, away from the tracks of men and animals. Around their dwellings they cultivated the land. The ground is first cleared and roughly chopped up with a bill hook and after it has been set on fire, the crop is sown. Tapioca, cholam, sweet potatoes, plantains, chillies form their staple food; but they supplement it with wild roots and honey. They also grow some ganja and tobacco for their personal consumption. They used to tap toddy from the wild palms in the evergreens before prohibition was introduced. Most of them had bows and arrows or muzzle loading guns years ago, and they used to trap animals also for their food: but after coming into contact with the people of the plains they have given up their culture and are showing interest even in picture houses. When their land shows signs of loss of fertility, that is after a year or two, they move on to another spot and repeat the process of clearing, burning and plantnig. But now

they do not practise shifting cultivation since some have been given a permanent colony near Kannikatty and the others take up cultivation in regeneration areas. They get good harvest every year, but they are so indifferent to the methods of storage, that more than half of it is eaten by rats and insects. Originally, they were all Hindus; but some of them took to Christian faith under the patronage of the Jesuit fathers in Kattalamalai estate. Their language is a mixture of Tamil and Malayalam; some of them are literate, and served the Forest Department. Each settlement has a hereditary headman, who exacts implicit obedience and is much respected. The marriage tie is much respected. As a class, they are good guides to go through the jungles, but poor at tracking game. The Kanis near Kannikatti are less sophisticated than their kinsmen at Kodamadi and Upper Dam. The oldest and chief Kani is one Mathan Kani, a non-agenarian at the Kannikatty colony, where they have settled down permanently, growing their food crops, including mangoes, jack fruits, etc. With some sympathy and tact the Kanis prove to be a set of fine people, though a bit torpid.

182. The Paliyans, numbering in all about twenty, are found in the Sivagiri Puliyara and Vasudevanallur forests foot hills. They have short bodies, squire faces, thick lips and unkempt hair; their language is Tamil. Their natural food consists of wild roots and honey; but they have now taken to rice and vegetables; however cultivation and cattle breeding are totally repugnant to them. The little money they get from Minor Forest Produce contractors in exchange of honey, tamarind, gallnuts and other minor forest produce they spend on clothes, betel leaf, tobacco, etc. The Paliyars, as a class are subjected to much maltreatment by the minor forest produce contractors who generally try to pay them at the rates they were paying twenty years ago. Most of them suffer from Malaria and of late leprosy has started creeping in. They have the habit of keeping dogs in large numbers to take into the forest for help and in addition pets like parrots, malabar squirrels, mouse deer, etc., in a settlement are not uncommon.

183. *Kumridars.*—Kumri cultivation is regularly done in the regeneration areas by the Kanis and the people from the plains. Most of the teak plantations and all the matchwood plantations were raised in this manner. The work of clearing regrowth, heaping, burning and weeding is done entirely by the kumridars. Their favourite crop is tapioca, as it gives a substantial return of as much as Rs. 300 per acre and requires least attention except to keep off the wild pigs for which they put up a good fence. Besides tapioca, they grow some plantain, chillies, gourds, tomato, etc. They love tapioca so much that all attempts made in the past to dissuade them from growing that crop have proved a failure. The position is that, if we prohibit tapioca, there will not be any kumridars. The practice of free kumri cultivation has not spread to Sivagiri Forests so far and its absence is clearly seen on the condition of the plantations. It will be advantageous to attract kumri cultivation even by cash payment for clearing and burning, for, the advantages and benefit earned by the planted forest species will be worth anything in view of the fact that the Kumridars keep the planting site free of weeds all through the year, which condition cannot be obtained even by spending Rs. 50 per acre departmentally.

CHAPTER V—PAST SYSTEM OF MANAGEMENT.

SECTION 1—GENERAL HISTORY OF THE FOREST.

184. The earliest history of the division begins with the Pandyan rulers, who were in possession of the present Tirunelveli, Ramanathapuram and Madurai districts till the middle of the sixteenth century A.D. when the Nayakkar dynasty took over. The Pandyans attained such a high degree of plitical, commercial and social standards as to have had ambassadors from early Greek rulers and to be mentioned in Greek writings. The Nayakkar rule that followed came to an end with the Muhammadan invasion in 1736 of Chanda Sahib. Later, after a brief period of struggle between the French and the British for mastery over the presidency, the district with the other Carnatic provinces, passed into the hands of the British in 1781 with a limited scope. In 1801 the district came under the complete control of the East India Company, who appointed Mr. Lushington as their first Collector. No form of control seems to have been exercised by the Indian rulers over the forests since there was no necessity at the time and the forests extended so deep into the plains, that travelling from one place to another exposed one to robber gangs, who throne well in the intervening jungles.

185. *Early British period* (1801–1854).—For years, the forests attracted little attention as there were too much of them and the tendency was to encourage and extend cultivation. People were given the unfettered privilege to cut wood for agricultural implements and fuel in head loads for personal use. Timber extracted was taxed, but

in the absence of any control or supervision it was ineffective. However, minor forest produce and non-vanurable timber fetched a small amount as " hill rents ". All attempts to enforce any form of control on this kind of removal proved fruitless; and during the course of fifty years most of the forests in the plains and some in the outer ghats were denuded. This at last caught the attention of the Board of Revenue.

186. *The Jungle conservancy period* (1854–1866).—With a view to halting this unrestricted cutting of trees and to exploiting the forests under a uniform set of rules, the Board of Revenue in Circular No. 5497 of 1860 laid down certain principles. According to this, wood for agricultural implements, house construction, etc., and fuel for domestic use were free and could be taken from areas set apart for that; no fruit tree nor any timber trees exceeding three feet in girth at two feet from ground level nor any reserved tree could be felled without the permission of officers in charge; and fuel or timbers for sale could be extracted after paying a prescribed seigniorage fee, Unauthorised cutting and evading to pay the seigniorage fees were made punishable under the Penal Code. The tax under this system collected by a special staff was kept as " Jungle Conservancy Fund " to be spent on raising fuel plantations close to villages, with the object of meeting eventual scarcity of fuel. This fund was administered by the Collector at his discretion. This scheme also did not work well because it was not through and many of the good timber species were not included in the list or reserved trees, and the effort to form village plantations was a total failure due, chiefly, to public apathy and poor knowledge of technique. Again, the entire work of collecting the seigniorage fees was entrusted to the village officers on a commission basis, which in due course defeated the very object.

187. Between 1795 and 1800, the Commercial Resident of the East India Company imported nutmeg, cloves, Cinnamon and other species from the Moluccas and introduced them on the Kuttalam hills. Later coffee, tea and cocoa were also introduced and in 1843 the then Collector Mr. E. B. Thomas began to prune and manure the gardens; yet the quality did not compare well and the profit was very little. Therefore in 1853 all the gardens were sold away; but when the purchasers also found the estates unremunerative they surrendered them back to the Forest Department. However, some like Thekkumalai Estate, Vasudeva Estate, Kuliratti Estate, etc., still survive cultivating fruits, spices, plantain, Jack, mangosteen, silk cotton, pineapple, etc. The largest of these is Thekkumalai estate covering about 616 acres near Kuttalam. Attempts were made by some coffee planters to disreserve some of the evergreen forests near Kannikatty, but Mr. MacGregor, the then Sub-Collector of Sermadevi successfully prevented it in the interest of the river system.

188. *Transition period* (1865–1882).—By now, the subject of forest conservation was taken up seriously, by Government and Captain Beddome was appointed in 1864 as an adviser to the Collector on forest matters and to organise the " Special Department " in charge of forests. This move created a stir among the zamindars and Mutts who promptly filed their claim over a large portion of the forests; consequently, all activities had to be restricted only to the undisputed forests. The ghat forests of Papanasam and the south were placed under the charge of one daffadar and three peons, to be supervised by the Sub-Collector at Sermadevi while the forests to the north of Kuttalam were put under the control of an Overseer of the "Special Department ". The unwieldy jurisdiction and over-work to the staff made the scheme a failure resulting in the appointment in 1866 of Captain Fullerton as the first District Forest Officer in charge of the " Special Department ".

189. Credit for organising a Forest Department in the district goes to the then Collector Mr. Puckle after whom several bridle paths are known even today. He was the man to foresee the importance of the catchment areas for the irrigating rivers and the illeffects brought about by clearing the ghat forests in the name of coffee, tea and spice gardens; for this purpose he prohibited charcoal burning and clearing of forests, and regulated grazing and cutting trees for timbers or fuel under system of licences. This, of course, led to some friction between Mr. Puckle and Mr. Fullerton since they did not see eye to eye in methods of execution.

190. This move to integrate the forests primarily in the interest of the river systems was good, but unfortunately the Zamin forests, notably the extensive Singampatti Zamin forests, sandwiched in the midst of Government forests were like a thorn in the flesh, Heavy grazing, unrestricted cutting and clearing, frequent fires were a menace to the Thambaraparni river system; added, the repercussions of fires extended into the adjoining state forests. To overcome this, Government filed a claim to the Singampatti forest in the High Court, which only established the right of the Zamindar, lated to be confirmed by the Privy Council. However, Government did not show interest in the other zamin forests of Chokkampatti, Sivagiri, Vairavankulam, T.N. Pudukudi, etc., as they did not affect the river systems.

191. The Kattalamalai Estate of about 4,000 acres in Papanasam reserve and owned by the Chokkampatti Zamindar forms the catchment area for Kariar river. This block came up for court auction in 1893 and was purchased by the Roman Catholic Mission for Rs. 17,000 now it has passed into the hands of Sri Pothihasala Thevar, who has made extensive coffee and fruit gardens in it. It cannot be denied that Government at that time could have easily brought this forest at the auction.

192. At present, all the ex-zamin forests have been brought under the Forest Department.

193. *Tank Beds.*—Attention was next concentrated on the various tank beds of the district containing good natural growth of *Acacia arabica, Acacia planifrons* and *Prosopis spicigera*. In 1876 there were about 18,500 acres of such growth; this was put under the charge of Mr. Lowry, a Sub-Assistant Conservator. However, from the beginning there was a lot of differences between the forest officer and the revenue officials with reference to restrictions over grazing and felling timber for agricultural implements; and this resulted in transferring the control to the revenue department under G.O. No. 112, dated 27th January 1882. Later, attempts were made by the Forest Department to constitute these tank beds also into reserve forests; but protests from the people and the Revenue Department put an end to the proposal for ever. Till to-date, these tanks beds are under the complete control and supervision of revenue officers who occasionally consult the Forest Department to assess the value of standing trees; and of late, frequent thefts and difficulty to protect the trees have resulted in early and quick sale of the trees. Grazing continues to be free.

194. Revenue realised from the tank bed trees is given below :—

Year. (1)	*From trees.* (2)	*From pods.* (3)
	RS.	RS.
1885–86	5,374	2,236
1886–87	4,372	4,211
1887–88	5,945	4,577
1888–89	12,607	2,714
1889–90	5,556	4,375
1890–91	18,621	4,012
1891–92	18,092	2,354
1892–93	17,551	2,375
1893–94	19,841	99
1894–95	14,382	4,336
1895–96	2,402	6,094

195. *The Forest Committee* (1878–1882).—In the ghat forests the old system of allowing ryots to take free fuel and small timber and to graze cattle with the Tahsildar's permission was in vogue. In course of time this arrangement also deteriorated, prosecutions generally failed; with the result illicit cutting was on the increase. To overcome this, in Tenkasi taluk, Mr. Puckle cut a boundary line between the lower slopes and the rest of the forests during settlement, so that the lower slopes could serve as " village forests " for the people to take their requirements from, while the portion above the line could serve as protected forests where free cutting and grazing were prohibited. This can be called as the first attempt to constitute a reserved forest and the boundary line, then called as " cairns line ", forms the reserve boundary of to-day.

196. By about this time, the great floods of 1877 gave further impetus to forest conservation. Damage to roads, bridges and tanks alone was over 1·5 lakhs of rupees, besides the loss of crops, buildings, etc. In 1878 Col. Beddome and the Collector Mr. Pennington drew the attention of the Government to the frequent floods caused by the unrestricted cutting of forests and extensive clearing made in the evergreen forests for coffee and tea estates and strongly advocated that Government should interfere to save the catchment areas and that as a matter of immediate necessity control over Singampatti Zamin forest and Kattalaimalai estate was essential. The Board of Revenue strongly supported the views of the Collector pointing out that cultivation paying a revenue of Rs. 15 lakhs should be safeguarded immediately and urged the Government to arm itself with full powers by passing a Forest Act.

197. Consequently, in 1878, was constituted a Forest Committee consisting of Mr. Pennington the Collector, Mr. Hayne the District Forest Officer and Col. Campbell Walker to go into the question of reservation and forest policy. The Committee's recommendations were accepted by Government, but not given effect to until the Madras Forest Act was passed in 1882. The recommendations were :—

(i) Mr. Puckles principle of "Cairns line" demarcating village forests and reserve forests should be extended to the entire district.

(ii) Out of the total forest area of 559·19 square miles in the district 286·81 square miles should be constituted into reserve forest and divided into seven blocks.

(iii) No fresh pattas to be granted in ghat forests.

(iv) Since no right to free grazing existed, pasture to be permitted only on payment.

(v) Control over private forests should be exercised, for their conservation.

(vi) Grazing in village forests should be regulated by Collector and District Forest Officer.

198. *Sir. Dietrich Brandis's visit in* 1882.—A landmark in the history of the division was the visit in February 1882 of the Inspector-General of Forests, Sir Dietrich Brandis, whose voluminous report has become a classical work and guidance for all working plans. It was also during this visit that he discovered a new species of Reeds in the interior shola forests named—after him as *Ochlandra Brandisii*. He summarised the object of forest conservation in the division as follows :—

(i) To protect the ghat forests for a continuous water supply in the various river systems upon which irrigation, and consequently prosperity of the rypt depended.

(ii) To maintain the fuel supply and to increase fodder resources of all waste lands that can be set apart for forest growth.

199. His recommendations can be summarised as follows :—

(1) Though coffee cultivation was important, the benefit derived from it would not be comparable with the drainage that would be done to the catchment areas of the irrigating rivers. The performance of coffee on the eastern slopes was already given a poor impression. Therefore, no more land need be alienated for coffee or other cultivation from the ghat forests.

(2) The whole area above the revenue survey of cultivable lands should be constituted into a reserve forest under the Forest Act, without allowing any such thing as "Village Forests" as this would safeguard the interests of irrigation in the plains. Further, a forest boundary half way up the hills would be difficult to select and maintain and would render protection from illicit removals almost impossible.

(3) Requirements of villagers adjoining forests should be met from waste lands within Revenue Survey limits and this was not possible, small timber for agricultural implements, fuel and grazing facilities should be made available from restricted areas outside the blocks that are fire-protected.

(4) The degenerate condition of outer slopes, regression of the shola forests, destruction of young seedlings and coppice regeneration, open and stunted condition of the deciduous forests, and the hardened improverished soil that was unable to retain the rainfall and regulate the flow of streams, were all attributed to annual fires rather than to excessive fellings.

(5) A band of fire watchers, mostly from the hill tribes, should be organised and they should be paid according to the success of fire protection and not on a flat uniform scale.

200 Timber consisting of teak, *Hopea parviflora*, *Pterocarpus marsupium*, *Vitex altissima* and *Balanocarpus utilis* was being felled and converted into scantlings and brought down to depots at Ambasamudram and Sankarankoil by contractors who were paid at fixed prices per cubic foot. Fuel and charcoal were removed on payment of the following siegniorage fees :—

	HEAD-LOAD.		CART-LOAD.	
	RS.	NP.	RS.	NP.
Junglewood	0	12	2	00
Firewood	0	03	0	37
Charcoal	0	09	1	50

Minor forest produce was bought from collectors and then sold by tender. Sir Dietrich, who advocated continuation of the system estimated the average annual revenue as follows :—

	RS.
Timber	10,000
Fuel and Charcoal	7,000
Minor Forest Produce	5,000
Total	22,000

The estimated expediture was—

	RS.
Fire protection	10,000
Rest-Houses and roads	6,000
Establishment	16,000
Other outlay	8,000
Total	40,000

This left a deficit of Rs. 18,000 and another deficit of Rs. 2,000 from the forests of the plains. But under good management, he anticipated only an annual deficit of Rs. 10,000, justifiable in the interests of the river system on which the prosperity of the district depended.

201. *The period of organization* (1882–87).—The five years immediately following Sir Dietrich's visit saw great activity in organising and distributing staff, fire-protection and collection of revenue to meet the increased expenditure. The Padarmalai and Kolltheri felling series were the first to come under special protection and all extraction and removal was done under a permit system for which permit clerks, checking stations, additional watchers and forest guards were employed. In 1884, Mr. Cherry realised the unwieldy nature of this permit system and ordered that removal could be made only from localised places specially set apart and that the rest of the area should be protected and tended. He also ordered the preparation of simple working plans and topographical maps. Timber Transit Rules were for the first time drafted and made applicable to the ghat forests.

202. This permit system for removing fuel and timber even from localised places proved very difficult to control and supervise. Therefore, in 1886, the District Forest Officer, Mr. Brasier initiated the idea of annual coupes for working the forest. The first annual coupe of 30 acres was worked departmentally under a " coppice with standard " system in the Kuttalam reserve, resulting in a loss of Rs. 7 per acre. He also enforced that all head-loads of dealwood should be removed only from these annual coupes. And with a view to improving the evergreen and semi-evergreen forests of Ambasamudram taluk all hollow and overmature trees of *Hopea and Balanocarpus* were extracted at the rate of 6,000 cubic feet a year. Because of conversion by axe the wastage was a high as 50 per cent, but this was promptly converted into charcoal leaving a cleaned up forest and yielding a handsome revenue.

203. *The working plan era* (1888–1915).—As the next stage in progress, departmental working gave place to the system of felling and transport of the coupe materials being done by contractors for the department. Then in 1889, Mr. Brasier introduced the system of selling the produce standing; and to encourage contractors, even low prices were accepted. In 1891, the principle of working areas for sustained yield was introduced and in 1895

the first working plan for 3,046 acres—the Padarmalai Working Circle—was prepared and sanctioned. In the next decade, a series of working plans were prepared for almost the entire district as shown below :—

Serial number. (1)	*Date of sanction and authority.* (2)	*Working Circle.* (3)	*Area in acres.* (4)	*Author.* (5)
1	1895 B.P. No. 1107	Padarmalai	3,046	H.B. Bryant.
2	1897 B.P. No. 44	Kuttalam	1,839	Do.
3	1897 B.P. No. 44	Sivasailam	3,154	Do.
4	1897 B.P. No. 2721	Ayyanarkoil	4,296	Do.
5	1897 B.P. No. 2721	Valaikulam	1,145	Do.
6	1897 B.P. No. 2721	Rengarkoil	2,265	Do.
7	1897 B.P. No. 378	Kalakad	3,264	Do.
8	1898 B.P. No. 55	Kadayanallur	1,670	Do.
9	1898 B.P. No. 62	Karuppannasamikoil	1,847	Do.
10	1901 B.P. No. 247	Vellanad	5,087	P.M. Lushington.
11	1901 B.P. No. 250	Teri Reserve	13,840	Do.
12	1901 B.P. No. 263	Milavittan	616	Do.
13	1901 B.P. No. 336	Sattur	2,995	Do.
14	1902 B.P. No. 210	Pudupatti	1,167	Do.
15	1902 B.P. No. 211	Tirukarungudi	2,538	Do.
16	1902 B.P. No. 213	Srivilliputtur ghats	38,035	Do.
17	1902 B.P. No. 276	Nanguneri	55,677	Do.
18	1902 B.P. No. 292	Ottaipidaram	616	Do.
19	1902 B.P. No. 295	Vaippar	2,995	Do.
20	1902 B.P. No. 295	Tinnevelly	..	Do.
21	1903 B.P. No. 121	Koilteri	1,909	Do.
22	1903 B.P. No. 286	Terkuviravanallur	5,969	Do.
23	1903 B.P. No. 129	Srivaikuntam	..	Do.
24	1903 B.P. No. 130	Kotamadakki	1,811	Do.
25	1903 B.P. No. 53	Kalivayur	158	Do.
26	1911 B.P. No. 189	Puliangudi	3,100	H.A. Latham.
27	1916 B.P. No. 393	Vadargarai, Melpidagai and Kilpidagai.	458	D.T. Barry.

N.B.—Items 13, 18, 20 and 22 apply to Babul growth in tank beds.
Items 1, 2, 3, 8, 9, 21, 26, 27 belong to present Tirunelveli North Division.

204. The main objects of these working plans were :—

(i) To define the water sources that are to be strictly protected.

(ii) To regulate in a simple manner the exploitation of timber in the evergreen and higher semi-deciduous forests.

(iii) To control grazing.

(iv) To build roads and buildings in a systematic way for the development of the forests.

(v) To supply the neighbouring population with a sustained quantity of small timber, fuel and charcial.

205. In order to preserve the catchment areas of the more important rivers and streams, boundaries of the higher reaches were well defined and all fellings and grazing were prohibited so as to enable the shola and semi-deciduous forest to extend themselves. The more accessible and exploitable evergreen and semi-deciduous forests were worked under a selection system with a felling cycle of six years, at one tree per acre. The exploitable girth for *Vitex altissima* was fixed as 6 feet and over while for the other species it was 4½ feet and over and trees were sold standing for a lump-sum. Generally, they followed the principle of one tree per acre, but the marked trees were never properly distributed. The deciduous forests were worked under a modified "coppice withstandard" system (the standards had no rotation), the coupes being worked by the department or a contractor. None of the working plans, however, anticipated the necessity for artificial regeneration although all coupes felled coupes were closed to grazing for the first six years.

206. Villages were allowed to graze two bulls and one cow at half rates for every five acres owned and for the rest they paid the full fee of 0·12 nP. per animal. During the hot season they used to take the cattle deep into the forest and pen them; this in course of time led to the formation of " hill grazing compartments". The grazing fee was raised to 0.25 nP. and then in 1896 was reduced to 0.19 nP. for all animals.

207. The District Forest Officers of this period for the old Tirunelveli Division were :—

Serial number and name of office. (1)	*From* (2)	*To* (3)
1 Mr. Hayne	1878	1884
2 „ Brasier	1884	1891
3 „ Thornton	1891	1895
4 „ Moss	1895	1895
5 „ H. B. Bryant	1895	1899
6 „ P. M. Lushington	1899	1903
7 „ R. D. Richmond	1st April 1903.	15th May 1905.
8 „ H. O'Neil	16th May 1905.	15th August 1905.
9 „ R. D. Richmond	16th August 1905.	17th March 1906.
10 „ H. O'Neil	18th March 1906.	19th March 1906.
11 „ D. T. Barry	20th March 1906.	21st March 1907.
12 „ R. D. Richmond	22nd March 1907.	3rd January 1908.
13 „ H. A. Latham	4th April 1908.	24th March 1910.
14 The Treasury Deputy Collecter	25th March 1910.	28th March 1910.
15 Mr. A. B. Myer	29th March 1910.	28th April 1910.
16 „ H. A. Latham	29th April 1910.	1st January 1912.
17 „ D. N. Strathie	2nd January 1912.	11th January 1912.
18 „ A. B. Myers	12th January 1912.	21st January 1912.
19 „ T. P. Peake	22nd January 1912.	16th September 1916.

208. *Revision of working plans* (1917–1959).—By 1915 many of the original working plans expired and new working plans for hitherto unworked areas had to be prepared. Accordingly, on 6th September 1917, Mr. J. C. Bobinson was appointed as Working Plan Officer; but unfortunately on 4th February 1919 he was transferred, rendering all the work done for one and half years at a cost of Rs. 16,000 a waste. For the next five years also nothing was done until in 1924 the District Forest Officer, Mr. George Venugopal prepared a working plan at short notice. This did not get the sanction of the Chief Conservator of Forests, who, however, approved it as a temporary scheme for three years with an order that the District Forest Officer should revise and make it a working plan. Again nothing was done till 1930 when Mr. B. J. Singh, the then District Forest Officer prepared the second working plan. Since this also did not get the Chief Conservator's sanction Mr. E. A. Lasrado was appointed as Working Plan Officer on 22nd November 1934 for the old composite Tirunelveli Division. He prepared a ten-year plan which was to expire on 31st March 1944. To revise this plan Mr. V. S. Krishnaswami was appointed in 1942; but due to want of time he prepared a brief working scheme which was not given effect to. The Chief Conservator of Forests, however, extended the currency of Mr. Lasrado's working plan. Then Mr. B. A. Cariappa, who was appointed Working Plan Officer on 12th June 1947 prepared a fifteen-year plan for the composite Tirunelveli Division. This was to expire in March 1964 and in the meanwhile by reorganisation, the new Tirunelveli North Division was formed and to prepare a new plan Mr. S. A. Rahmathullah was appointed Working Plan Officer; but when he left the division on promotion as Conservator of Forests, the writer took up the work from 28th November 1959. The Working Plan Officers of this era are :—

Serial number and name of Working Plan Officer. (1)	*From* (2)	*To* (3)
1 Mr. J. C. Robinson	6th September 1917.	4th February 1919.
2 „ George Venugopal	1924.	1925.
3 „ B. J. Singh	1930.	1932.
4 „ E. A. Lasrado	22nd November 1931.	25th January 1934.
5 „ V. S. Krishnaswamy	1942.	1944.
6 „ B. A. Cariappa	12th June 1947.	31st October 1948.
7 „ S. A. Rahmatullah	15th November 1958.	26th October 1959.
8 „ G. J. Rajasingh	28th November 1959.	—

209. *Working the Evergreen forests* (1928–1948).—Due to lack of roads and comparatively difficult terrain, the evergreen forests remained untouched except for an occasional felling and experiments to study the silviculture of the species. In this connection no

praise will be too high to Mr. D. T. Barry, the then District Forest Officer, for his pioneering experiments and the fund of information he has left for us about the evergreen forests. He did excellent work in Kannikatti and Kodaimadi where he raised even aged crops of *Hopea* and *Balanocarpus* under a modified sdelterwood system, gardling all useless species suppressing the advance growth. However, this work was very expensive, the girdled trees could not be sold and they were liable to fall and damage and seedlings of useful species.

210. By now, the absence in India of a market for softwoods and the acute demand for timber to rehabilitate the devasted areas in France and Belgium after the Great War of 1914–1918 made many a forest officer look upon the rich hitherto unexploited evergreen forests as an inexhaustible source. Nonetheless, an understanding of their comparative inaccessibility, the presence of only a few useful species scattered among hundreds of useless stems, the scant knowledge about evergreen species and the value of sholas in protecting the catchment areas, acted as a sobering factor. Mr. A. W. Lushington, who examined the scheme, made sample enumerations and gave the following results :—

Timber yield per acre—	TONS.
Kadamadi (average type)	40
Kannikatti (average type)	76
Kannikatti (good type)	167

N.B.—From factor adopted 0.50 and 50 cubic feet was taken as one ton. Small wood and brushwood were expected to double the yield.

211. Finally, in 1919, Mr. P. M. Lushington, who visited the division, made some revolutionary proposals to top the evergreens. They were :—

(1) Clearfelling evergreens and planting with *Gluta travancorica, Mesura ferra, Dysoxylum malabaricum, Diospyros sp.* and *Aglia roxburghiana* about 2,500 feet. Lower slopes should be planted with teak admixed with *Hopea*, *Balanocarpus*, *Cedrela toona*, *Vitex altissima*, and *Filicum decipiens*.

(2) To construct an electric tramway of 20 miles from Ambasamudram to Kodamadi and power to be generated from the 600 feet water-fall at Kuttalam Kalaruvi.

(3) To erect a saw mill and pulp mill at Kodaimadi.

(4) To construct a bridge across the Servaiar at Mundanthorai wide enough to take both road and train line.

(5) The fuel demand of 200,000 tons from the division could be met partly from the sholas.

212. In 1920, the Chief Consrvaetor of Forests ordered a detailed investigation of the project by the Forest Engineering Branch, embracing rest houses, labour sheds, extent and yield of forests and methods of regeneration. Mr. Lemos, who was appointed a special officer, prepared stock maps, laid out 75 miles of bridle paths and carried out enumerations over 228 acres. For this purpose, Ambasamudram Range was bifurcated into Kannikatty and Kodamadai Ranges in 1921. The investigation showed the following facts :—

	SQ. MILES.
A. Pure evergreen	20
B. Semi-evergreen	10
C. Deciduous	2
D. Reed Areas	33
Total ...	65

Only the evergreen and semi-evergreen forests (types A and B) were considered exploitable and the average yield per acre was estimated to be 100 tons of fuel and 100 tons of timber from the evergreen areas and 50 tons of fuel and 50 tons of timber from the semi-evergreen forests. This was a very optimistic estimate and it gave hopes of the following estimate of the forest value :—

	Timber. TONS.	*Fuel.* TONS.
20 square miles of evergreen forests with yield	1,280,000	1,280,000
10 square miles of semi-evergreen forests with yield ..	320,000	320,000
Total ..	1,600,000	1,600,000

Value of timber at 0.50 nP. per cubic foot or Rs. 25 per ton of 50-cubic feet. Fuel was valued at 0.25 nP. per ton.

213. These estimates gave the capital value of the forest as 4.04 crores. Upon this, the Chief Engineer, Mr. Martin, an expert on American logging methods, proposed a big project consisting of a railway from Ambur to Kodamadi (*via*) Mundanthorai, supplemented by logging machinery, tractors, ropeways, saw mill, etc., at a cost of Rs. 25 lakhs. The expected annual return was Rs. 6.15 lakhs which was nearly a handsome 25 per cent as follows :—

	RS.
Fuel	60,000
Timber	4,00,000
Sawmill	2,00,000
Charcoal, etc.	15,000
Total ...	6,15,000

214. In 1927, the Chief Conservator of Forests, who inspected the areas ordered that annually 100 acres should be worked and that under light selection fellings only trees of over 7 feet in girth should be felled and converted into scantlings, and *Mesua* to be sawn into sleepers. Advance growth of valuable species, in the coupes were to be tended and given proper light; and wherever it was lacking, nursery seedlings were to be planted and seeds were to be dibbled. Mr. B. Kesava Vittal organised this work in 1928 as a Special Officer, and in 1930 left it to be continued by the territorial staff. In 1928 the first evergreen forest coupe of 61 acres at Kannikatti was worked departmentally spending Rs. 8,990; excluding over-heads, it fetched a net revenue of Rs. 440 out of a total 8,000 cubic feet of timber. This departmental working continued till 1931 and the results are shown below :—

	Coupe number.				
	I	*I*	*I*	*II*	*III*
Year of working	1928	1929	1930	1930	1931
Area worked in acres	61	..	..	45·5	30
Number of trees marked	153	..	..	108	75
Number of trees converted	132	9	9	96	67
Number of *Mesua ferrea*	35	3	6	24	32
Number of other species	97	6	3	72	35
Gross yield in cubic feet.					
Mesua ferrea	3,370	241	523	1,632	2,176
Other species	11,729	726	312	7,396	5,073
Net yield in cubic feet.					
Mesua ferrea	1,365	91	200	940	2,017
Average outturn per tree	39	30	33	39	63
Other species	6,633	395	74	4,690	4,684
Average outturn per tree	68	66	25	65	134
Average net yield per acre of all species.	..	143	..	124	223
	RS.	RS.		RS.	RS.
Total cost of extraction	8,947	413		5,402	6,361
Total revenue	9,025	526		7,932	5,493
Net profit	78	113		2,530	2,132
Net profit per acre worked	..	3·75		45·56	71·06
Net profit per tree	..	1·37		24·06	31·81

215. This departmental working showed that it was profitable to work the evergreen forests and that not more than three trees per acre should be removed, if we were to preserve the evergreen advance growth. The success of departmental working encouraged local contractors to purchase the standing trees from annual coupes. Generally the price obtained was low for a long time, but it increased later on as can be seen from the following tables :—

Locality of working. (1)	*Year.* (2)	*Coupe.* (3)	*Area in acres.* (4)	*Number of trees.* (5)	*Price obtained.* (6)
					RS.
Kannikatty	1932	IV	57	151	800·00
Kodamadi	1932	I	47	159	1,300·00
Kannikatty	1933	V	66	138	862·50
Kodamadi	1934	I	206	401	4,413·69
Kodamadi	1935	II	200	403	3,871·37
Kannikatty	1936	VII	190	270	2,970·00
Kannikatty	1939	VIII	178	303	3,120·00
Kannikatty	1940	IX	230	323	4,501·81

Locality of working. (1)	*Year.* (2)	*Coupe.* (3)	*Area in acres.* (4)	*Number of trees.* (5)	*Price obtained.* (6)
					RS.
Kannikatty	1942	X	155	215	3,170·00
Kodamadi	1943	IV	238	181	13,394·00
Kodamadi	1944	III	222	98	17,934·00
Kodamadi	1945	V	261	182	64,574·00
		VI	232	257	
Kodamadi	1946	V	132	118	35,050·00
		VI	257	101	
Kodamadi	1947	V	132	14	19,040·00
		VI	257	105	
Kodamadi	1948	VI	257	44	7,040·00

216. Thus, between 1928 and 1948, during the twenty years of working the evergreen forests, 1,713 trees were felled from an area of 1,003 acres in Kannikatty locality and 2,016 trees were felled from an area of 1,795 acres in Kodamadi locality. With the advent of contractors' purchasing the standing trees, the entire burden of the staff eased and consequently, from 1st October 1933 once again Kodamadi range and Kannikatty range were amalgamated into one Ambasamudram Range.

Under Mr. Lasrado's Working Plan, the evergreen forests were exploited but in execution, marking was generally uneven and never well distributed.

217. *Grazing fee regulation.*—From 1896 the grazing fee was 19 nP. per cow; but in 1917 this was enhanced to 0.50 nP. per cow, more to discourage grazing in reserve forests than to get revenue. The date from which this came into force in the various ranges are given below:—

Name of Range. (1)	*Authority.* (2)	*Date.* (3)
Kuttalam	B. P. No. 148, Miscellaneous.	9th May 1917.
Ambasamudram	B. P. No. 273, Miscellaneous.	8th June 1917.

This enhanced grazing fee had the desired effect; but the hardship it caused to the villagers was immense and consequently from 1st April 1939 this fee was reduced to 25 nP. per cow unit. This rate prevails till to-date.

218. *District Forest Officers.*—The District Forest Officers of the period under review in the composite Tirunelveli Division were :—

Name. (1)	*From* (2)	*To* (3)
Mr. D. T. Barry	17th September 1915	4th April 1917.
Mr. H. W. Woodhouse Adolphus.	5th April 1917	10th May 1917.
Mr. D. T. Barry	11th May 1917	17th October 1917.
Mr. Md. Habibullah	18th October 1917	26th October 1917.
Mr. D. T. Barry	27th October 1917	10th April 1918.
Mr. G. C. Robinson	11th April 1918	4th May 1918.
Mr. D. T. Barry	5th May 1918	1st September 1918.
Mr. A. B. Jackson	2nd September 1918	7th November 1918.
Mr. D. T. Barry	8th November 1918	15th August 1919.
Mr. T. Clear	16th August 1919	21st September 1919.
Mr. S. V. Devadasan	22th September 1919	22nd October 1919.
Mr. W. C. Hart	23rd October 1919	31st October 1920.
Mr. D. T. Barry	1st November 1920	17th May 1921.
Mr. George Venugopal	18th May 1921	28th June 1923.
Mr. A. Hanumantha Rao ..	22nd June 1923	28th September 1923.
Mr. George Venugopal	29th September 1923	11th October 1925.
Mr. E. M. Gothers	12th October 1925	15th October 1926.
Mr. B. J. Singh	11th June 1926	....
Mr. J. G. Longrigg	16th October 1926	26th July 1928.
Mr. N. Thirumurthi	27th July 1928	2nd April 1929.
Mr. H. G. Hicks	3rd April 1929	4th November 1929.
Mr. B. J. Singh	5th November 1929	20th May 1932.
Mr. E. A. Lasrado	21st March 1932	20th June 1932.
Mr. B. J. Singh	21st June 1932	14th July 1932.
Mr. A. A. Khan	15th July 1932	26th February 1933.
Mr. E. V. Padmanabha Pillai ..	27th February 1933	25th January 1934.
Mr. E. A. Lasrado	26th January 1934	2nd November 1934.
Mr. C. R. F. Williams	3rd November 1934	3rd April 1935.
Mr. E. A. Lasrado	4th April 1935	11th November 1935.
Mr. F. D. Ardahgh	12th November 1935	19th May 1936.

Name. (1)	*From* (2)	*To* (3)
Mr. E. A. Lasrado	20th May 1936	20th November 1936
Mr. E.V. Padmanapa Pillai ..	27th February	25th January 1934
Mr. J. H. Longgrig	21st November 1936	31st December 1936
Mr. E. A. Lasrado	1st January 1937	14th January 1937
Mr. H. G. Hicks	15th January 1937	21st May 1937
Mr. E. A. Lasrado	22nd May 1937	24th December 1937
Mr. V. G. Darrington	25th December 1937	20th September 1938
Mr. N. S. Ghate	21st September 1938	30 th January 1939
Mr. J. C. Wrench	31st January 1939	30th April 1939
Mr. Amir Padsha Sahib	1st May 1939	27th June 1939
Mr. H. G. Hicks	28th June 1939	23rd March 1943
Mr. K. T. Mathew	24th March 1943	8th April 1944
Mr. S. Narayanaswamy	9th April 1944	8th May 1944
Mr. K. T. Mathew	9th May 1944	19th April 1945
Mr. V. Vridhachalam	20th April 1945	19th May 1945
Mr. K. T. Mathew	20th May 1945	18th April 1946
Mr. K. S. Muthanna	19th April 1946	18th May 1946
Mr. K. T. Mathew	19th May 1946	24th June 1947
Mr. A. V. Sundaram	24th June 1947	6th August 1948
Mr. B. A. Cariappa	7th August 1948	21st August 1948
Mr. Sankaranarayana Rao ..	22nd August 1948	17th May 1949
Mr. K. V. Lakshmikantha Rao ..	18th May 1949	29th May 1949
Mr C. S. Mannadiar	30th May 1949	31st August 1949
Mr. M. B. Kalappa	1st September 1949	4th July 1950
Mr. K. Andiappan	5th July 1950	31st July 1953
Mr. Narayanan Nair	1st August 1953	10th August 1956
Mr. P. Ramachandran	11th August 1956	17th May 1958

219. District Forest Officers of Tirunelveli North Division since its formation on **6th February 1937 are as follows :—**

Mr. J Willson	6th February 1957	11th June 1958
Mr. K. Venkadakrishnan	12th June 1958	13th June 1958
Mr. S. A. Rahmathullah	14th June 1958.	6th July 1958.
Mr. J. Wilson..	7th July 1958.	..
Mr. E. Jacob	7th July 1958.	12th March 1959.
Mr. P. Ramachandran..	13th March 1959.	..

History of Shencottah Forests.

220. With the addition of Shencottah taluk to Madras State on 1st November 1956, Puliyara and Vellakalteri reserve forests and Achempudur reserve land passed on to the control of this division from its parent Kerala Forest Department which till to-date, has not transferred any of the important documents like settlement records, control journals, maps, registers, etc.

221. To begin with, these forests were under the control of the Revenue Department till 1872, during which time fuel and small timber were removed by people on permits. The forest Department, on its taking over, abolished the permit system, extracted timber through contractors and sold it from Puliyara timber depot—all managed by a Superintendant who had a band of peons and wathers and two checking stations at Kanupulli and Mekkara. The principal species marketed were *Hopes Pterocarpus marsupum, Albizzia lebbeck* and teak. Along with the departmental working the public were allowed to take timber on permits, resulting in confusion, which led to the revival of the old permit system, supplemented by an excise duty on timbers. In 1892, Mr. T. F. Bourdillou, as Conservator of Forests, Organised the department, and by more intensive working, large quantity of timber, fuel and charcoal were put in the market. But much of it was smuggled into adjoining Madras State as the duty on such produce taken for domestic use by the subjects of Travancore across the border was much less. The repercussions of this unregulated felling finally induced the Government in 1905 to evaluate the growing stock and prepare working schemes.

222. The period of organisation saw the formation in 1914 of Shencottah division, and the preparation in 1916 of a working plan for Arvankavu by Mr. K. S. Narayana Iyengar. The objects of management were to extract the mature and over-pasture trees, to convert the crop into a normal stock and to replace the inferior species by more valuable ones under one series, with 15 annual coupes. Since most of the forests of the division were left uncovered by this working plan, in 1930, Sri Narayana Iyengar prepared a simple

scheme called Mulakachampara Working Circle, for the Puliyara reserve forest. Under this scheme, 2,273 acres of Puliyara reserve forest were to be worked in a thirty year rotation under "coppice with standard System", the number of standards to be left being 15 to 20 per acre. The object of working was to meet the local requirements of fuel, charcoal and agricultural implements; but the system failed as such that in 1943, the scheme was suspended.

223. Under a similar system embodied in a separate working scheme for 603 acres prepared by Sri Narayana Iyengar. Vellakalteri reserve forest was worked with a rotation of 24 years upto 1943 with a break of eight years. This system was replaced by a simple coppice system from 1943, since, here also, the standards left were the poorest stems. The average yield per acre from these coupes was 7 tons of fuel, 3 tons of timber and 7 tons of charcoal, fetching about 25 to 50 rupees per acre.

224. These and other piecemeal working plans were revised and consolidated into a single working plan in 1946 by Mr. M. N. Menon, who placed both Puliyara and Vellakaltheri forests under a fuel working circle with a rotation of 24 years, followed by tending, thining among coppice and artificial regeneration at suitable places. But many of the prescriptions were not carried out. One of the peculiar practice was in some years to make the coupe contractors burn and plant up the felled coupe with teak by incorporating it, as one of the conditions of the contract. Naturally the work was never done in time and plantations were very poor. The following teak plantations were raised by the Kerala State :—

Year. (1)	*Locality.* (2)	*Area in acres.* (3)
1956	Puliyara Reserve Forest.	50·0
1953	Neeliamman Koil.	7·5
	Ulkonam.	3·0

225. *Beedi leaf (Diospyros melanoxylon).*—Beedi leaf (Diospyron melanoxylon) Plantations of 5 acres in Vellakalteri and 10 acres in Puliyara forest raised in 1942 and 1943 have done fairly well; but there is no demand for the leaves. The Sandal introduced near Ulkonam in Puliyara reserve over ten cents has spread itself to about three acres. There is no natural sandal in those forests.

226. Puliyara and Vellakalteri forests are full-fledged reserve forests notified under Section 18 of the Travancore Forest Act; but the nature of rights and concessions are unknown since the settlement records are still with the Government of Kerala. One right still exercised by the people is to remove free dead wood and grass from Puliyara reserve for domestic use under G.O. Ms. No. 3888, Food and Agriculture, dated 20th December 1957.

227. Under Kerala Government, the grazing fee for sheep was 0.25 nP. per year and for other animals, except goats, it was free. But animals from Madras State were designated as "foreign cattle" and all had to pay grazing fees.

HISTORY OF EX-ZAMIN FORESTS.

228. With the abolition of zamins under the Madras Estates Abolition Act of 1948, the zamin forests, 8 in all were taken over by Government. The extent and date of taking over each forests are given below :—

Name. (1)	*Area.* (2)	*Date of taking over.* (3)
Singampatty	56,100	19th February 1952.
Sivagiri	18,259	15th October 1951.
Uthumalai	3,472	Do.
Chokkampatti	3,000	Do.
Vairavankulam	5,000	Do.
Okkaninranpothai	50	Do.
Vellakalparambur	112	Do.
T. N. Pudukudi	1,986	Do.

229. Except Singampatty and Sivagiri forests, the other estate forests have very little history behind them and contain very poor growth, for, they were never managed properly, except to serve as a source of quick money for the lavish needs of the owners. Illicit felling and unauthorized clearings flourished under the very presence of a small and poorly paid staff which the owners maintained. Demand for charcoal and fuel, booked by high prices during the second World War, accelerated the pace of destruction. Added uncontrolled, grazing and browsing by goats reduced most of the areas to scrub jungle. The worst of the lot is Chokkampatti forest which is no better than a sheet rock, and the other forests of Uthumalai, Vairavankulam, Okkaninranpothai, Vellakalparambu contain Odai. Kalli, Kiluvai, etc. However, T. N. Puthukudi forest contains a poor type of coppice teak over about 500 acres.

230. Of the two forests worth consideration, namely Singampatty and Sivagiri, a full account is already given about Singampatty forest in Tirunelveli South Working Plan of 1959 by Sri S. A. Rahmatullah, while giving prescriptions for the entire ex-Zamin forest. Therefore, it is not proposed to repeat it here.

231. *Sivagiri forests.*—These lie at the north-western end of the district over the western ghats. The plain portions and outer foot hills support coppice growth of natural teak, which is a stunted variety, thriving on about 20 inches of annual rainfall; the upper reaches have stunted sholas and the middle regions supports moist deciduous growth with *Salmalia malabaricum* rosewood, Vengai, *Ailanthus excelsa*, etc. In the early days, the zamindar was getting the help of forest department in in managing his forests and accordingly sometime about 1908 Mr. R. D. Richmond prepared a scheme to work the forest under two series, namely, Kombaiar and Pechiamman series, on a twenty year rotation with " Coppice with standard " system. He even permanently demarcated the coupes to be worked in 20 years. In 1919, when the entire forest was brought under the purview of Section 26 of the Forest Act, the scheme was abondoned and all of fellings extraction and grazing began to shape according to the notification, supervised by a Ranger or Forester deputed by the Madras Forest Department. But the zamindar and his Dewan always looked upon the forest staff as their fetters.

232. In 1935, Mr. Richmond's scheme was revised, but the area was increased, coppice with standard system was replaced by simple coppice with a rotation of 30 years. The old permanent demarcation of coupes was retained and ten more coupes were added to each series from the interior making the total area to be worked as 8,900 acres. One coupe in each series was to be worked from 1936; but this was by-passed and all the thirty coupes were clear-felled within the short period from 1936 to 1944 to take advantage of the high prices and acute demand during the war. The present stand, therefore, consists only of coppice growth varying in age from 16 to 24 years.

233. With the stopping to work any further coupes, from 1945, illicit cutting for fuel, small timber, charcoal, etc., increased, and the famine conditions and lack of employment finally drove the people to look upon the forest as a source for their daily living.

234. When the forest was taken over by the forest department, the new Sankarankoil range was formed and a new scheme was drawn up in 1953 with the object of improving the stand. Under this scheme, the 60 worked coupes of the two series were to be differentiated into three regions and then dealt with.

235. *Region I.*—This consists of the interior 18 coupes on steep slopes frequently burnt. The area would be given rest for ten years and then felled from 1964 in the following order :—

Kombaiar series.			*Pechiamman series.*		
Coupe number.	*Area in acres.*	*Previous working.*	*Coupe number.*	*Area in acres.*	*Previous working.*
(1)	(2)	(3)	(4)	(5)	(6)
XXII ..	118	1939	XXII	150	1940
XXIII ..	197	1940	XXIII	180	1940
XXIV ..	221	1940	XXIV	70	1940
XXV ..	152	1939	XXV	147	1939
XXVI ..	44	1940	XXVI	110	1940
XXVII ..	99	1940	XXVII	121	1940
XXVIII ..	66	1940	XXVIII	80	1940
XXIX ..	173	1940	XXIX	87	1940
XXX ..	100	1939	XXX	68	1939

236. *Region II.*—This would consist of 11 coupes in each series on the plains and foot hills. Since the growth consisted of badly coppiced stools and crooked poles, each year one coupe was to be clear-felled and coppiced properly so as to raise a good growth. The coupes would be closed to grazing for five years after felling and charcoal burning was prohibited. From 1957, in the clear-felled coupes softwood is being planted, for which much larger areas are being felled. Coupes so far worked under this scheme are shown below :—

Kombaiar series.			*Pechiammankoil series.*		
Coupe number.	*Year of working.*	*Area in acres.*	*Coupe number.*	*Year of working.*	*Area in acres.*
(1)	(2)	(3)	(4)	(5)	(6)
X	1953–54	181	XVI	1953–54	220
VII	1954–55	179	XXI	1954–55	75
V	1955–56	150	I	1955–56	145
IV	1956–57	176	II	1956–57	167
III	1957–58	131	V	1957–58	157
II	1958–59	272	VI	1958–59	173
			VII	1958–59	157
			VIII	1958–59	156

237. Coupes I, II, V and XX of Pechiammankoil series were planted up with *Ailanthus excelsa* in 1957 and 1958, which cannot be called a success.

238. *Region III.*—This comprises the gentle slopes situated between the other two regions. The ten coupes in each series falling in this region would be tended at one coupe a year by retaining two or three good straight poles in each stool and removing the rest. The practice of selling the crooked poles standing to contractors were discontinued after 1957 as it was difficult to check the habit of substituting good marked poles for the crooked ones. Details of coupes taken up for this kind of cultural operations are as follows :—

Year.	*Series.*	*Coupe number.*	*Area in acres.*
(1)	(2)	(3)	(4)
1954-55	Kombaiar	XVIII	127
	Pechiammankoil	III	170
1955-56	Kombaiar	XVI	127
	Pechiammankoil	IV	134
1956-57	Kumbaiar	XV	138
1957-58	Kombaiar	XII	152

239. The softwood and dry fuel forest regeneration works done in the ex-zamin forests will be dealt with in the next section.

Section 2—Past Systems of Management and their Resplts.

240. *Simple Coppice.*—In the earliest days, those forests were exploited under a permit system without any restriction on the locality to be cut. Later, it was in 1886 that the system of clear felling annual coupes was first introduced in this division. The rotation fixed was 20 years. That this was too short a period for the dry tract to produce a sufficiently mature stock fit for a second cutting, became apparent at the end of the first rotation and brought about a change in the rotation to 30 years without reducing the annual area to be cut. Till to-date this rotation has been enforced as a policy. Perhaps, this policy may have to be revised sometime or other, for the several coupes under second and third rotations have sucessively deteriorated in quality and quantity per acre. Except for *Albizzia lebeek and Albizzia procera*, the mean annual girth increment at breast height for most of the species is 0.4 to 0.7 inch and for a majority, it is 0.5 inch, which means that in 30 years a stem reaches 15 inches in girth not a very good size.

241. Natural regeneration by coppice is a process combined with the working of a coupe; and the job is usually done well by the contractors who have nearly fifty years of experience in this field. However, at times trimming of the stools is postponed to a few days after felling a tree, thus unnecessarily causing a second shock to the stump. Most of the species coppice well and some like neem, throw out root suckers also. *Strobilanthes* and climbers invade the clear felled area and form a dense mass choking the natural seedings which in this kind of forest are strong light demanders. The trouble in these forests is not want of seedlings, but the inability of these seedlings to tide over the following summer heat and perhaps a forest fire. The rigors are aggrevated by the hard shallow soil and unreliable monsoon.

242. Even in 1907, artificial regeneration of the fuel forests was taken up by dibbling and broadcasting hundreds of pounds of seeds of some thirty important species in fuel coupes. This was continued for a long time till recently; but this technique did not produce any useful results.

243. At present all fuel coupes are worked according to conditions embodied in the lease deed which is more or less the same for the whole State. Species yielding minor forest produce, etc., are retained in fuel coupes. They are *Santalum album*, *Tamarindus indica*, Palmyrah, *Salmalia malabaricum*, *Terminalia chebula*, Neem, Poongam, *Bassia latifolia*, *Bassia longifolia*, *Sapindus*, *emarginatus*, Bamboos. Also saplings of vagai, rosewood and *Chloroxylon sewietenia* of 18 inches girth at five per acre are retained.

244. In conclusion, it can be said that the simple coppice system is the easiest and a practical method to work the forests; but the retrogression after each rotation is a problem to solve. Artificial regeneration may be possible in suitable areas, but most of the areas do not lend themselves to this treatment.

245. *Coppice with standards system.*—In the early years of reservation, the first object of management was to improve the growing stock, with the result only over-mature, unsound, useless and malformed trees were felled leaving a greater part of the growth intact. The first working plan to be prepared in 1895, covered the Padarmalai series of Ambasamudram range with this system and the first coupe was worked in that year itself. This is not the conventional silvicultural system; but a modified form

in which the standard seed bearers are left well distributed over the coupe and the standards have no rotation for themselves. Most of the timber-*cum*-fuel series were worked under this method on a rotation of 18 years leaving 20 to 25 standards per acre. But the following were the disadvantages of the system :—

(i) The task of measuring and marking the standards in many coupes, which were nearly 100 acres each, was too much for the subordinates of the lower ranks.

(ii) The standards left per acre were only 15 to 20 per acre and not uniformly distributed.

(iii) Standards were frequently damaged while felling other trees, or were stolen by the lessees. Owing to their sudden isolation and exposure in the coupe, many of the standards got damaged by wind.

(iv) The poor rainfall and soil conditions never allowed the standards to grow to any big size timber; this defeated the very purpose of the system.

(v) With such a short rotation of 18 years, there were difficulty for useful growth in the second rotation. The temptation was to leave the younger trees as standards and fell the older standards.

(vi) The odds against natural regeneration were in no way less than those under the simple coppice system.

246. In coupes worked under coppice with standards, artificial regeneration was first started in 1903 by Mr. Richmond and then continued by other District Forest Officers also. Later, it was also incorporated as a prescription in Mr. Lasrado's Working Plan, but the results were so disappointing that in 1940 it was abandoned. According to this method, which was called *rab sowings*, seeds of teak, rosewood, vengai, etc., were dibbled in lines of 10 feet apart and thereafter no attention, whatsoever was given. Occasionally some areas tended gave better results, but for that, it was a failure. In 1915 this technique was modified, but without success. By this method, lines 15 feet apart were cleared and seeds were sown on mounds one foot high. In all these operations, tackling excessive areas, sowing late in June after the burst of the south-west monsoon and consequently the reduced time available for the seedlings to establish, and want of tending, brought about total failure.

247. However, on good loamy soil these regeneration works have given phenomenal success as at Tiger Falls where tamarind, neem, vagai, *Eucalyptus hybrid*, Casuarina, *Acacia ferruginea*, were raised under kumri cultivation between 1945 and 1955. It is worth visiting these plantations.

248. Attempts to eradicate *Strobilanthus* were made at various times from 1921. It was cut departmentally, transported and sold for a profit ; then removal was permitted on head load tickets. But these had no effect because it sprouted again and again. Similarly, a prescription to heap and burn this weed in all fuel coupes at the time of felling, also proved impracticable.

249. In Mr. Lasrado's Working Plan and thereafter, the coppice with standard system was abolished and the forests were worked on a 40 year rotation under the Timber-*cum*-fuel working circle.

Evergreen Timber Working.

250. In the old composite Tirunelveli division earliest working of the evergreen forests was taken up in 1886 after carrying out some sample surveys in the sholas of Ambasamudram range in 1883. From 1886 to 1896, on an average about 6,000 cubic feet of *Hopea* and *Balanocarpus* were extracted annually from Ullar, Servaiar, and Kuduparai Valleys. The work was done departmentally at a cost of 80 nP. per cubic foot; but there was much wastage in utilization. For example, out of the 152 trees felled in 1899 only 28 were converted. Therefore, further extraction from these forests was stopped until the forests were opened out and demand for timber grew better. Even the construction of Kodamadi-Kallaruvi road in 1909 did not make departmental extraction profitable. Therefore, for the first time in 1910, fifty trees of mostly *Vitex altissima* were sold standing to a contractor at Rs. 5.50 per tree; in 1911 another fifty trees were sold at Rs. 6.50 per tree. The contractor must have made a good profit as the average net yield was 150 cubic feet per tree, one *Hopea* tree alone yield 317 cubic feet and the selling price was Rs. 3 per cubic foot for scantlings. But, the contractors shyness to bid at the auctions and the poor prospects of departmental working resulted in the suspension of this operation, till 1928.

251. Between 1908 and 1919, experimental opening of the canopy, tending the advance growth and broadcast sowing large quantities of seeds produced even aged crops in small patches near Kannikatty and Kodamadi. These results encouraged everyone to take up the work on a large scale as the necessity to improve the evergreen forests

was realised by then. Accordingly, from 1920, large scale regeneration and tending works in the evergreen forests prior to felling was taken up. To give more light to the advance growth, trees of useless species were girdled, climbers were cut, direct sowing and planting of seedlings was done wherever advance growth was absent. The expenditure incurred was nearly Rs. 17 per acre. Unfortunately the results were very poor, probably because of the poor knowledge about the silvicultural characters of the species and the heavy damage caused by rodents to the seeds. Added, while girdling some of the valuable species also were marked and destroyed; the subsequent operation of felling the exploitable trees destroyed the little advance growth that came up. All these factors led to the giving up of this treatment.

252. *The New Policy.*—Therefore, from 1927 the technique was reversed, i.e., the exploitable trees were first removed and then the gaps left were regenerated. Mr. Kesava Vittal as an officer on special duty conducted various experiments on nurseries, artificial regeneration and natural regeneration as a preliminary to large scale work. His conclusions are summarised in the following paragraphs.

253. *Nursery.*—To protect the seeds and germinating seedlings from pests, a 4½ feet high close fence is essential. Good seeds sown immediately after collection give a high germination per cent. The depth of sowing should not exceed the thickness of seed and a thin covering of leaf mould especially over smaller seeds is desirable. Watering during germination and non-rainy months is essential. Nurseries in the open should be shaded during the hottest part of the day. Seedlings from the open nurseries (i.e., not under shola shade) stand transplanting better than those from nurseries under shola shade, even though the latter looked healthier.

254. When a tree is felled it damages all the surrounding growth and leaves a gap. The sawyer cuts down all sapplings in the neighbourhood to give free movement and space for the scaffold. The brushwood and leaf mould are burnt as they attract a gad fly. Thus, hardly any regeneration is left in the gap. With the poor coppicing power of the evergreens, the damage done is of a permanent nature, therefore artificial regeneration is necessary.

255. *Dribbling.*—Mr. Kesava Vittal came to the conclusion that the expenses were not worth the results. Seeds of *Mesua, Balanocarpus, Eugenia* and *Dysoxylum* were badly devoured by animals. Seeds of *Aglaia, Poeciloneuron, Chukrassia* and *Hopea* are available at a very inhospitable time for sowing. Species with small seeds like *Vitex* and *Cedrela* are best propagated with nursery seedlings. The only species that can be dibbled successfully are *Gluta, Heritera papilio* and *Acrocarpus.*

256. *Transplanting.*—The south-west monsoon generally bursts in the first week of June and after a short break, it comes on again. It was found that transplanting during the second onset gave best results. The following table gives more information for the different species :—

Species.	*Optimum.*		*Remarks.*
	Age.	*Height.*	
(1)	(2)	(3)	(4)
Mesua ferrea	1 year	6 inches	Three to four months old seedlings give fair results.
Chukrasia tabularis	6 months	6 „	
Balanocarpus utilis	3 „	..	
Cedrela toona	6 „	..	One year old stumps can be transplanted.
Dysoxylum	9 „	8 inches	
Hardwickia pinnata	6 „	..	
Acrocarpus	6 „	6 inches	One year old seedling of 1½ feet are stump planted.
Hopea	1 year	4 „	

257. Owing to the rather slow rate of growth in the early years, cutting weeds and grass around the seedlings for two years is essential. The percentage of survivals at the end of the years was 40 to 60 and for *Balanocarpus utilis* it was 100 per cent. It is advantageous to plant *Acrocarpus, Chukrassia* and *Vitex* seedlings in the centre of a gap where the greatest amount of light fell and *Mesua* and *Hopea* seedlings near the periphery where shade was at its maximum. *Gluta* seedlings did well in the intermediate space. Hopea and Balanocrpus thrives best at an elevation of 1,000 to 2,000 feet and do not thrive at higher levels above 2,500 feet. The cost of regeneration came to rupees 3 per acre.

258. *Natural Regeneration.*—The necessity to open out the canopy gradually to lift up the natural regeneration has been understood for a long time. In Mr. Lasrado's Working Plan it was prescribed that annually 25 acres in a coupe should be tended for the benefit of the existing natural regeneration under the personal supervision of the District Forest Officer, so that when the subordinates get used to the work the area could be increased. At the same time seedlings of evergreen timber species were planted annually over 10 acres near Kannikatty. A review of the work done up to 1942 showed that the effect oftending and planting was not in any way beneficial to the forest and consequently the Chief Conservator stopped the work once for all. It must be admitted that our knowledge of the evergreen species is still backward and the crown manipulation which requires great precision for the different species becomes a difficult task for the subordinates. Difficulty to identify and differentiate the useful species at the early ages results in the cutting down of valuable seedlings by ignorant labour. The work itself is such that when once bad work is carried out it can never be rectified again, and it is very difficult to assess whether the tending has been carried out properly unless the controlling officer is bodily present when the work is carried out. In the midst of such practical difficulties, tending and regeneration works in evergreen forests have always created some friction in all places.

259. Under Mr. Cariappa's Plan the evergreen forests were given complete rest from 1948 till to date.

Teak Plantations.

260. The first teak plantation of the division was raised in 1907 by Mr. R. D. Richmond over 0.91 acre in the semi-evergreen forest of Kariar valley. The full stocking and quick growth in the early stages encouraged further planting in conjunction with kumri cultivation by the Kanis. All these plantations up to 1915 had to be clearfelled because they fell under the submergible areas of Hope lake. From 1917 further planting was taken up at Kodamadi and Seriaiar valley.

261. Up to 1915 all plantations were raised by transplanting nursery seedlings at 6 feet by 6 feet in one foot cube pits during the north-east monsoon between October and November. From 1917 to 1925, the technique was altered in that planting during the south-west monsoon in July was done; but unfortunately, the planting operations dragged on till November due to poor organisations, with the result casualties were as high as 66 per cent. To reduce casualties and to compensate the shortage in stumps seeds also were dibbled at the time of planting. Stump planting was first done in 1922 on an experimental scale over 3 acres, but it ended in failure due to planting in the north-east monsoon. Failure to appreciate the superiority of planting during the south-west monsoon and the reluctance to change orthodox practices brought about heavy casualties and extensive replacements in all the teak plantations raised up to 1932 until planting in the south-west monsoon was enforced by Mr. Lasrado's Working Plan. But still the importance of completing the work quickly was never realised, instead dilatory planting spready over April to July defeated the very object. The south-west monsoon breaks at any time between May and June and planting should be done when the ground is sufficiently moist which it is at any time between mid April and mid May. In this context it has to be noted that the lease period at present extends up to the end of March, which means burning, aligning and planting cannot be done in time. Therefore, the lease period should be fixed in such a way that all clear-felling works are completed by February. In Shencottah range the clear-felling contractor is made to do the heaping and burning at his cost; this practice is neither desirable nor practicable as seen from the confusion it has created.

262. *Weeding.*—The neglected state of the older plantations of 1943 to 1950 has frequently been pointed out in the inspection notes of the division. Boundaries between plantations are overgrown with bushes beyond recognition.

263. Almost all the plantations are raised along with Kumri cultivation, but the custom has been to get the weeding done free by the kumridar without regard to the time schedule. The general tendency of the subordinates everywhere is to take a very sympathetic attitude to the kumri crop because the kumridars are poor people, but this tells upon the teak plantation and leaves a lasting effect. Technical works like planting and weeding should be done departmentally at proper time without expecting the kumridars to do them, if we want the plantation is succeed. From 1934 onwards, three weedings in the year of formation and two weedings in the following year were given; but cutting climbers and fas growing miscellaneous species does not seem to have been given any importance.

264. *Thinning.*—These were to be carried out on a five year cycle from 1934 as prescribed in the Working Plans; but this was never done regularly. Always there were arrears and only in 1959 these were completed. Generally, thinnings were very light even for good quality plantations, for, when teak was planted it never had any target of size nor market to cater for.

265. In 1954 the Chief Conservator of Forests, introduced " Elite Thinning " for all teak plantations in the State. According to this, mechanical thinnings were discarded and at the first thinning itself the marking officer selects 50 elites per acre well distributed over the site as the future crop to be retained after the final thinning. All subsequent thinnings will aim at giving proper freedom and growing space to the elites only, no bother being taken about the rest of the crop. This thinning was prescribed with a view to preventing very heavy thinning. The chief defects of this thinning were that it sets aside all yield tables, ignored the valuable intermediate yield from thinnings and it presumed that the growth and differentiation of individual trees were constant. Above all, it ran counter to the fundamentals of Forestry by trying to get the maximum volume and revenue from a certain number of trees instead of from a unit area. However, this was abandoned in 1959 and once again ordinary thinning was resorted.

Matchwood Plantations.

266. The first ever attempt to plant matchwood was made in 1953 when five acres in the 1917 teak plantation of Kodamadi and 5.6 acres in the neighbouring natural forest were unsuccessfully underplanted with *Salmalia malabaricum* and other species. In the following year also when a 50 acre plot failed, the scheme was abandoned.

267. In 1956 the work was resumed, but under the system of clearfelling and planting, subsidised by the Government of India. In Sivagiri forests, *Ailanthus excelsa* seedlings raised in baskets and six months old are planted out in north-east monsoon. In Ambasamudram range, two month old basket seedlings of *Ailanthus excelsa* in one foot cube pits and one year old marked seedlings of *Salmelia malabaricum* in crowbar holes are being planted regularly at 16½ feet by 16½ feet at the beginning of the south-west monsoon. According to the Chief Conservator's orders in 1958 in the field, teak is being planted in quincunx in Ambasamudram range. It may be worthwhile to plant *Eucalyptus hybrid* also on an experimental scale. The following plantations were raised up to 1958 :—

Range. (1)	*Locality.* (2)	*Year.* (3)	*Area in acres.* (4)	*Cost per acre.* (5) RS.
Ambasamudram—	Mylar	1956	93	35·20
	Upper Dam	1957	44	31·46
	Upper Dam	1958	68	31·94
Sankarankoil—	Sivagiri	1957	44	136·00
	Sivagiri	1958	267	92·46
	Sivagiri	1959	151	..

Results indicate that for planting in Ambasamudram Range April-May is the best time and one year old naked seedlings can be used; and for planting in Sivagiri the proper time is October-November and one year old basket or pot plants should be used. It is also found that kumri cultivation greatly reduces competition from weeds which otherwise wipe out whole plantations at times.

Afforestation of Fuel Forests.

268. Under the first Five-Year Plan in 1953 was launched a scheme regularly to reclaim the degraded fuel forests by planting the more hardy fuel species in the form of plantations. The scheme was more to benefit the ex-panchayat and ex-zamin forests just taken over, and accordingly Uthumalai and Mayamankurichi forests were taken up first. In the first year, trenches of 5½ feet long and one foot by one foot across were dug at intervals alongs lines cut 33 feet apart, and seeds of Vagai, Neem, tamarind and *Prosopis juliflora* were sown on the mound formed of the dug out earth on the lower side. In addition, one foot cube pits were dug at 33 feet intervals along the lines and planted with seedlings of neem, vagai and *Prosopis* raised in containers. In 1954 and

1955, the entire work was done at closer espacement, i.e., the lines were cut 22 feet apart for the trenches which were dug longer, and the pot plants were put in pits at 22 feet by 22 feet and into the centre of the trenches. The following areas were planted during the first five years :—

Year. (1)	*Locality.* (2)	*Area in acres.* (3)	*Cost in rupees.* (4) RS. NP.
1953	Uthumalai	63	2,173 00
1953	Uthumalai	137	
1954	Padarmalai	250	5,761 00
1954	Mayamankurichi	150	5,667 72
1955	Mayamankurichi	50	1,844 84

269. After a break of one year the work was taken up in 1957 under the Second Five-Year Plan. The technique adopted was always basically the same, i.e., in strips at 33 feet intervals were dug trenches of desired length and then pot plants in pits and seeds on mounds were put in. On level ground, instead of trenches, shallow pits of saucer shape were dug and plants were put in. The following areas were planted out up to 1958 :—

Year. (1)	*Locality.* (2)	*Area in acres.* (3)	*Cost in rupees.* (4) RS. NP.
1956	Sivalarkulam	75	1,945 12
1956	Mayamankurichi	25	533 06
1956	Mayamankurichi	65	1,171 83
1957	Sivalarkulam	160	5,182 12
1958	Uuthumalai	142	4,673 11

270. On the whole, the problem of afforesting the dry fuel forests still remains unosived. The percentage of suvivals usually falls down to 30 per cent in the first year and year after it comes down ultimately leaving only 5 to 10 per cent. The few that survive are surprisingly vigorous and healthy, the principal species being vagai, odai and neem. *Eucalyptus hybrid* and Sissoo grow very well for the first one or two years, but thereafter they stagnate and begin to die out. The reasons for failure of all these plantations are as follows :—

(i) The principal factor is the adverse rainfall which is always ill-distributed and erratic leaving 8 to 9 months of dry period. Since no rain falls from the south-west monsoon, seedlings are unable to tide over the summer after planting.

(ii) The soil itself retains very little moisture as it is hardened due to trampling by cattle.

(iii) Generally, nurseries were not raised in time to produce one year old sturdy basket plants. Seedlings planted out in haphazard manner suffer from shock and waste their time in establishing themselves instead of growing before summer.

(iv) Frequent change in technique left a lot of confusion in the minds of the staff, who were unable to grasp the object of them.

(v) Often unsuitable areas were taken up for regeneration, for the sole reason that the existing growth is very poor. In this respect one cannot find worse area than Mayamankurichi and Sivalarkulam forests, where the smallest soil particle is as big as a potato.

271. Very strangely, natural bamboo is absent practically, except in Shencottah range. Bamboo (*Bambusa arundinacea*) was first introduced by Mr. Haynes in 1884 at a cost of Rs. 200 in Aladiyur beat of Ambasamudram range. The success of this venture encouraged further propagation of the species between 1903 and 1912 in Kariar, Sivasailam, Vallam, Idaimuttikidai and Talaiani. During 1934 to 1944 a second instalment of bamboo planting was done in Aladiyur, Servaiar, Palaiar; but no large scale planting could be done for various reasons.

272. Revenue realised from bamboos in the division is given below :-

Year. (1)	*Locality.* (2)	*Revenue in rupees.* (3)
1922	Aladiyur	230
1951	Koilteri	195
1952	Kuttalam	4,200
1952	Aladiyur	175
1956	Aladiyur	250
1057	Koilteri	240
1958	Kuttalam	3,200

273. In Puliyara Forest there is a good growth of bamboos which hitherto under Kerala Government was exploited only in piecemeal by a permit system according to which the consumer could cut anywhere he liked. Under this working plan this and the bamboos in adjoining Kuttalam range will be worked under a working circle.

Fire Protection.

274. The interest in fire protection seems to have been aroused by the visit of Sir Dietrich Brandis in 1882 to the division, for 1884 wos done the first fire tracing on the Mundanthorai plateau covering 40 square miles. Later in 1888 fire tracing was done in Kuttalam Range also. Gradually fire protection assumed importance and a system of internal fire lines and fire patrols during the fire season was established. The adjoining Travancore State and the Zamindars also volunteered to contribute a share towards these fire protection works. This system worked very well so long as people had respect for law and protection was easy; but now the situation has so deteriorated that forest fires have become a part of the forest and it is almost impossible to prevent it. The area's reportedly burnt according to fire reports and maps are grossly an under-estimate. The outer fringes and fuel coupes are the worst burnt areas and all attempts to close such burnt areas to grazing proved neither possible nor practicable. Therefore, this inevitable evil continues.

275. Hitherto, no special fire protection has been given to plantations and fuel coupes though occasionally fire spreads into them without damage.

SECTION 3—SPECIAL WORKS OF IMPROVEMENT UNDERTAKEN.

276. *Roads.—M*ost of the forest roads now in use were laid out in the early days of the division when itself the interior forests were taken up for working. But comparatively, there has been no marked improvement even under the five-year plans in recent times. The Papanasam-Kariar road constructed in 1887 has been handed over to the Electricity department after the Papanasam hydro-electric power station was commissioned.

277. When the proposal to supply cheap timbers to Europe was mooted a network of bridle paths was laid out in 1929. The total length of the paths was 75 miles, but most of them, except those leading to the rest houses, were abandoned when the scheme was given up.

278. The following statement gives a list of the bridle paths and roads under the Forest Department :—

Serial number and description.	*Length.*		*Cost.*		*Year of construction.*	*Remarks.*
(1)	(2)		(3)		(4)	(5)
	Kuttalam Range.					
	M.	F.	RS.	NP.		
1 Shenbagadevi bridle path	4	3	1,088	00	1891	For pilgrims and inspecting officers.
2 Tekkumalai bridle path	2	3	157	00	1891	
3 Puckles path	3	4			1891	
4 Budatarkoil bridle path	2	1	1,750	00	1886	
5 Krishnapuram valley bridge path ..	5	1	1,014	00	1901	
	Ambasamudram Range.					
6 Kariar-Kannikatty road	8	6	..		1887	Partly metalled.
7 Pechiammankoil Kuduparai road ..	8	2	1,993	00	1886	..
8 Mundanthorai—Kodamadi road ..	5	4	2,318	00	1909	Partly metalled.
9 Kodamadi—Knapp's Hut road ..	6	0				
10 Moolagajam—Tharavittaparai road ..	2	5	665	00	1901	
11 Bridle path from Knapp's Hut to Wood's Hut.	2	4				
12 Bridle path from Wood's Hut to Cox's Hut.	10	0	..		..	
13 Bridle path from Cox's Hut to Kuduparai.	7	0	..		..	
14 Path from Wood's Hut to Martin's Hut.	6	3	..		..	
15 Bridle path from Kannikatty to Martin's Hut.	7	0	..		..	
16 Bridle path from Kannikatty to Kerala State Boundry.	7	0	..		..	
17 Kodamadi Rest house road ..	0	4	266	00	1917	
18 Thirthakarai road	2	4	500	00	1895	
19 Cairn's line road	2	4	755	00	1898	
20 Aladiyur road	2	4	..		1920	
21 Puckle's path	2	1	..		1891	
	Shencottah Range.					
2 Kannupuli—Karingalodai road ..	3	3	..		..	

279. *Buildings.*—The division has a good number of quarters for subordinates and rest houses for camping officers, but some of the quarters in the plains are unoccupied as they are too far away from any of the villages and exposed to burglary. Another reason is the villagers who are booked by the subordinates for forest offences have a tendency to wreak vengeance on their household when they are out on patrol. This is the reason for the dilapidated condition of the quarters in Sankarankoil Range.

280. The two inspection sheds in the evergreen forests, namely, Martin's Hut and Wood's Hut, already dismantled are a great loss and it will be highly desirable to reconstruct them at an early date. Knapp's Hut is in very bad condition while the roof of Cox's Hut requires renewal.

281. The following list shows the buildings in the divisions :—

Serial number and description. (1)	*Year of construction.* (2)	*Cost in rupees.* (3)
RESIDENTIAL BUILDINGS.		
Kuttalam Range.		
1 Range quarters at Kadayanallur	1893	3,345
2 Subordinate's quarters at Kuttalam	1895	375
Sankarankoil Range.		
3 Subordinate's quarters at Chellapuli	1909	2.030
4 Forester's quarters at Chellapuli	1913	978
Ambasamudram Range.		
5 Forest Guard's quarters at Papanasam	1897	850
6 Forester's quarters at Papanasam	1925	1,040
7 Subordinate's quarters at Kodamady	1925	2,181
8 Forester's quarters at Kodamady	1916	1,179
9 Subordinate's quarters at Sivasailam	1912	1,882
10 Forester's quarters at Mundanthorai	1894	643
11 Forest Guard's Quarters at Mundanthorai	1903	800
12 Watcher's quarters at Mundanthorai	1914	2,354
13 Forest Guard's quarters at Kannikatty	1912	1,400
14 Cooly lines at Kannikatty	1922	989
15 Rangers quarters at Ambasamudram	1925	3,996
Shencottah Range.		
16 District Forest Officer's bungalow at Shencottah	1954	29,957
17 Rangers quarters at Shencottah	1952	9,160
18 Quarters at Kannupally (Foresters)	..	625
19 Forest Guard's quarters at Poolangudiruppu	1958	2,232
20 Forester's quarters at Mekkara	..	800
21 Forest Guard's quarters at Mekkara	..	600
22 Forest Guard's Quarters (B) at Mekkara	..	600
NON-RESIDENTIAL BUILDINGS.		
Kuttalam Range.		
1 Range Office at Kadayanallur	1896	643
2 Rest House at Kuttalam	1890	3,278
3 Range Inspection Shed at Kuttalam	1896	200
4 Tanah at Uthumalai	..	..
Sankarankoil Range.		
5 Rest House at Chellapulai	1911	1,345
Ambasamudram Range.		
6 Range Inspection shed at Papanasam	1897	1,031
7 Range Inspection shed at Kodamadi	1915	870
8 Rest House at Kodamady	1917	1,910
9 Cooly line at Kodamady	1922	940
10 Knapp's hut	1925	4,580
11 Cox's Hut rebuilt	1955	7,571
12 Rest House at Sivasailam	1893	910
13 Rest House at Mundanthorai	1892	2,758
14 Rest House at Kannikatty	1925	7,070
15 Range Inspection shed at Mundanthorai	1918	1,951
16 Range Office—Ambasamudram	1887	4,147
17 Lower Rest House at Kannikatty	1889	2,420
18 Checking station at Papanasam	1960	1,663

Serial number and description.	*Year of construction.*	*Cost in rupees.*
(1)	(2)	(3)
NON-RESIDENTIAL BUILDINGS—*cont.*		
Shencottah Range.		
19 Rest House at Mekkara	..	2,002
20 Range Office, Shencottah	..	2,000
21 Depot Office, Shencottah	..	500
22 Rest House at Puliyara	..	3,000
23 Forest Guard's station at Puliyara	..	600
LIST OF WELLS.		
Kuttalam Range.		
1 Well at Range quarters Kadayanallur	1896	150
Ambasamudram Range.		
2 Well at Range quarters Ambasamudram	1928	288
3 Do. (B) Do.	1899	200
4 Well at Sivasailam rest house	1893	..
Shencottah Range.		
5 Well at mekkara	..	..
6 Well at Puliyara	..	..

282. The forest Guards quarters at Mundanthorai is in a dangerous condition. The sooner it is replaced by a new building the better it is for the occupants. The Range Office at Ambasamudram has been handed over to the Health Department under orders of Government, and now the Range Officer's quarters also is about to be taken away. It will be more convenient and better if the Range Office and quarters are housed in a new building at the Papanasam Lower Camp, where every facility exists.

SECTION 4 PAST YIELD.

283. The following statement gives yield particulars of timber, fuel and charcoal from the various coupes worked from 1947 :—

Statement of yield from coupes worked from 1947

(Yield in each year)

Name of fuel coupe.	1947–48			1948–49			1949–50			1950–51			1951–52		
	Timber	*Fuel.*	*Charcoal.*	*Timber*	*Fuel.*	*Charcoal.*	*Timber.*	*Fuel.*	*Charcoal.*	*Timber.*	*Fuel.*	*Charcoal*	*.imber.*	*Fuel.*	*Charcoal.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)
1 Puliyangudi	5,660	1,028	31	1,560	474	45	420	482	13	200	184	88	2,660	545	47
2 Vasudevanallur	1.200	275	280	4,500	323	304	5,820	412	205	8,480	453	311	3,540	644	187
3 Karuppasamikoil	11,180	758	63	1,240	623	44	6,590	1,396	11	9,760	1.260	60	3,880	1,045	39
4 Kombaiar	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
5 Pechiammankoil	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..
6 Kadayanallur	4,000	736	337	560	606	296	60	254	310	680	361	481	440	301	296
7 Chinnakadu	900	219	220	1,380	125	490	1,940	58	453	1,700	57	546	780	100	279
8 Mathalamparai	1,320	130	83	1,480	385	199	520	253	59	20	87	80	100	52	154
9 Kuttalam	10,020	1,344	368	2,340	439	322	7,320	303	349	2.200	169	169	2.170	165	112
10 Koiltheri	16,060	1,020	..	14,340	1,078	..	5·560	614	..	4.420	739	..	6.540	634	..
11 Padarmalai	8,020	594	..	5,560	684	..	8.820	735	..	5.480	1,036	17	2.440	736	..
12 Govindapperi	3,920	986	37	4,020	415	202	7.540	448	45	20	425	56	140	162	149
13 Sivasailam	8,780	1,992	619	1;620	2 302	287	540	520	323	2·440	626	353	274	1.251	177
14 Ambur	1,480	637	69	2,600	1,195	158	..	1,133	32	..	748	56	220	459	147
15 Koraiar	11,760	1,383	27	500	1,348	294	3,200	622	91	4.420	731	..	1,580	902	27
16 Vadagaraimelpidagai	..	..	..	..	..	..	..	..	..	..	..	..	..	..	..

Statement of yield from coupes worked from 1947—cont.

(Yield in each year.)

Name of fuel coupe.	1952–53.			1953–54.			1954–55.		1955.56.		1956–57.		1957–58.		1958–59.	
	Timber.	*Fuel.*	*Char-coal.*	*Timber.*	*Fuel.*	*Char-coal.*	*Timber.*	*Fuel.*	*Timber.*	*Fuel.*	*Timber.*	*Fuel.*	*Timber.*	*Fuel.*	*Timber.*	*Fuel.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)	(13)	(14)	(15)	(16)	(17)
1 Puliyangudi	2,680	692	91	8,740	169	100	7,920	1,088	..	..	12,615	379	4,410	2,815	1,800	1,658
2 Vasudevanallur	1,500	541	144	5,720	1,010	310	3,160	2,124	7,160	1,770	6,600	233	6,440	1,743	7,200	2,067
3 Karuppanasamikoil	1,560	760	..	1,060	180	294	5,830	2,724	6,200	2,703	9,510	356	7,370	3,636	11,600	3,924
4 Kombaiar	..	..	..	..	..	..	3,220	1,016	6,460	951	3,440	306	..	..	..	8,769
5 Pechiammankoil	..	..	..	..	..	..	620	803	6,620	1,466	2,120	383	2,980	2,163	..	2,190
6 Kadayanallur	2,660	434	249	3,500	1,269	247	3,000	4,410	5,840	3,330	3,480	1,946	..	2,419	540	1,200
7 Chinnakadu	2,460	204	628	1,060	400	196	80	210	880	1,046	..	151	..	246	..	295
8 Muthalamparai	1,320	118	216	440	309	219	880	713	2,640	1,135	..	886	2,400	1,899	800	890
9 Kuttalam	1,880	441	188	1,860	450	68	390	885	..	..	..	..	..	..	..	..
10 Koiltheri	8,540	624	..	820	307	..	..	..	3,900	4,276	..	358	1,152	1,975	1,939	911
11 Padarmalai	2,300	826	12	1,000	688	33	1,560	1,129	740	4,122	320	1,101	7,232	2,435	1,500	791
12 Govidaperi	1,640	564	31	640	679	27	..	267	..	340	..	204	..	263	..	104
13 Sivasailam	5,920	581	139	3,480	672	765	..	1,313	1,780	3,010	80	1,735	..	1,207	..	578
14 Ambur	800	412	67	..	727	5	..	..	..	1,214	..	744	..	478	..	462
15 Konaiar	1,500	608	251	1,040	678	198	..	221	..	..	..	356	..	496	..	170
16 Vadagaraimelpidgai	..	..	..	..	..	..	7,440	516	8,820	337	..	..	3,680	561	23,710	1,415

NOTE.—Timber is given in cubic feet. Charcoal and fuel are given in tons.

284. The following statement shows the yield of sandalwood in the division from 1947 :—

Year.	Kuttalam Range.					Ambasamudram Range.				
	T.	Cwt.	Qrs.	LB.	Oz.	T.	Cwt.	Qr.	Lb.	Oz.
1947–48	1	0	0	16	0	0	5	3	1	8
1948–49	0	7	3	19	6	0	0	0	0	0
1949–50	0	11	3	6	15	0	1	1	24	0
1950–51	1	5	1	1	10	0	0	2	6	14
1951–52	0	15	3	12	8	0	0	3	26	4
1952–53	0	9	0	11	4	0	1	2	5	8
1953–54	1	0	2	2	0	0	0	0	0	0
1954–55	0	0	16	19	12	0	0	2	18	10
1955–56	0	14	0	21	8	0	0	0	0	0
1956–57	0	8	2	11	0	0	0	0	0	0
1957–58	0	1	5	10	9	0	6	14	9	0
1958–59	0	0	0	0	0	0	0	0	0	0

285. The yield figures maintained for minor forest produce are too very inaccurate and unreliable to be of any use. Therefore, the statement for minor forest produce is not given.

SECTION 5—PAST REVENUE AND EXPENDITURE

286 The following statements given particulars of revenue and expenditure of the division since its formation in **1957**:—

ABSTRACT OF REVENUE REALISED FROM 1956–57.

Year.	*Timber.*	*Fuel.*	*Bamboos.*	*Grazing Fees.*	*Compounding Fees.*	*Fines and forfeitures.*	*M.F.P.*	*Receipts from ex-Estate Forests.*	*Drift wood, etc.*	*Total.*
	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
1956–57	5,280·00	2,82,762·25	..	6,046·10	1,387·00	7,422·51	11,217·31	37,644·85	217·22	3,51,982·24
1957–58	9,740·00	6,91,210·75	412,08	5,392·35	3,679·23	8,830·83	13,158·75	19,051·92	1,000·43	7,52,476·14
1958–59	4,399·00	5,32,064·63	3,383·48	5,225·13	3,872·80	10,419·89	12,571·03	34,799·86	213 79	6,06,949·61
1959–60	2,76,075·10	5,19,289·00	416·59	6,332·30	3,664·00	13,292·26	13 400·46	42,533·28	1,092·15	8,76,095·14

ABSTRACT OF EXPENDITURE INCURRED FROM 1956–57.

Year.	*Roads.*	*Buildings.*	*Regeneration.*	*Survey of coupes, etc.*	*Department fellings of timber, etc.*	*Thinning, weeding, etc.*	*Fire protection.*	*Miscellaneous.*	*Pay and D. A. of staff.*	*Allowances.*
	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
1956–57	10,832·10	3,413·45	4,569·96	294·00	8,775·74	112·50	392·00	1,128·18	35,604·30	5,721·72
1957–58	8,540·79	720·00	3,796·60	530·54	21,393·84	163·75	882·00	8,804·33	70,568·87	12,176·68
1958–59	17,461.70	11,967·74	6,404·13	309·87	26,779·64	4,224·58	891·12	14,775·52	84·602·18	26 618·35
1959–60	42,394·47	9,268·49	8,175·64	340·50	34,707·10	4,360·00	555·00	9,221·88	78,481·69	43,270·41

Year.	*Contingencies.*	*F. T. A.*	*Matchwood plantation.*	*Soil conservation.*	*Teak planting.*	*Tax.*	*Expenditure on ex-Estate Forests.*	*Regeneration in dry fuel forests.*	*Boundary maintenance.*	*Total.*
	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.	RS.
1956–57	1,037·01	821·12	4,522·32	178·92	7,160·00	55·19	14,397·57	3,050·75	883·45	1,03,449·28
1957–58	5,710·10	1,108·55	2,545·15	954·35	857·77	846·90	15,478·99	..	374·13	1.55,463·34
1958–59	6,398·08	1,145·86	33,563·33	1,049·41	4,686·26	400·43	14,885·33	..	374·00	2,56,537·53
1959–60	10,500·58	1,212·90	34,693·67	13,467·57	4,129·36	745·99	15,957·28	12,242·13	236·50	3,23,961·11

CHAPTER VI—STATISTICS OF GROWTH AND YIELD.

SECTION 1—ENUMERATION, STOCKMAPS, ETC.

287. There are no sample or tree increment plots in the division to give a scientific picture of growth and yield in the division; but from the data picked up while writing this plan, some interesting trends can be made out.

288. *Evergreen Forests.*—In the absence of accurate data, yield of timber and small wood from a virgin evergreen forest has long been a subject of conjecture only. However, the interesting data gathered and left by Mr. A. W. Lushington in 1917 from two plots near Kannikatty will give a fairly good idea of the enormous stand. The following two tables give the standing timber volume of all species measured from two representative plots :—

PLOT I.

Diameter class in inches.	*Mean diameter in inches.*	*Basal area in square feet.*	*Average length of clean bole for the class in feet.*	*Volume per tree in cubic feet.*	*Number of trees.*	*Total volume in cubic feet.*
6–12	9	0·442	35	15·47	48	742·56
12–18	15	1·227	50	61·35	21	1,288·35
18–24	21	2·405	65	156·325	21	3,282·825
24–30	27	3·976	65	258·44	8	2,067·52
30–36	33	5·940	75	445·50	7	3,118·50
36–42	39	8·296	80	663·68	3	1,991·04
42–48	45	11·045	80	883·60	4	3,535·40
48–54	51	14·186	100	1,418·60	1	1,418·60
54–60	57	17·721	100	1,772.10	1	1,772·10

Total gross volume—19,216 c.ft.

Area of plots—0·90 acre.

Form factor adopted—0·68 acre.

Net real volume in the plot—19,216 by 0·68 is equal to 13,067 c.ft.

Volume per acre—14,519 cubic feet.

PLOT II.

Diameter class in inches.	*Mean diameter in inches.*	*Basal area in square feet.*	*Average length of clean bole for the class in feet.*	*Volume per tree in cubic feet.*	*Number of trees.*	*Total volume in cubic feet.*
6–12	9	0·442	30	13·260	99	1,312·74
12–18	15	1·227	40	49.08	25	1,227·00
18–24	21	2·405	50	120·25	9	1,082·25
24–30	27	3·976	50	198·80	7	1,391·60
30–36	33	5·940	60	356·40	5	1,782 00
36–42	39	8·296	60	497·76	1	497·76
42–48	45	11·045	50	552·25	1	552·25
48–54	51	14·186	55	780·23	1	780·23
54–60	57	17·721	55	974·605	1	974·61

Total gross volume—9,600 c.ft.

Area of plot—0·93 acre.

Form factor adopted—0·68 acre.

Net real volume in the plot—9,600 by 0·68 in equal to 6,528 c.ft.

Volume per acre—7,019 cubic feet.

289. It will be realised that Plot I represents a more luxuriant growth and normal forest than does Plot II. The average standing volume of timber can be taken as 10,769 cubic feet per acre. In other words, the timber contents of an evergreen forest is 150 to 300 tons per acre, excluding all small wood and top ends.

ENUMERATION IN EVERGREENS.

290. One of the most heavily exploited forests of the division are the evergreen forests and there was a general feeling that these forests should be given rest for some time till they recover from the strain. With this object, under Mr. Cariappa's working plan the Evergreen Forests were given complete rest from 1948. To review the position, a five per cent enumeration of all workable forests in the division was taken up. A convenient base line was taken across each block; along this line, at intervals of 20 chains, pegs were fixed. From these pegs, at right angles to the base line on either sides, strip lines were cut for easy movement, and pegs were driven at every chain on these strip lines. All trees of useful species falling within half a chain on either sides of the strip line were enumerated. Thus, the width of enumeration strips was one chain and the strips were spaced at 20 chains.

291. The following are the abstracts of enumeration :—

Kannikatty Block.

Workable area—1820 acres. Enumerated **area—91 acres.**

Species.	*Girth class in feet.*								
	3–4	4–5	5–6	6–7	7–8	8–9	9–10	10–11	Over 11
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Mesua ferra	106	77	70	36	20	4	3	1	1
Balanocarpus utilis	37	18	15	3	6	3	2	1	..
Gluta travancorica	197	145	98	72	55	21	19	12	2
Eugeni species	172	116	63	31	12	8	5	3	1
Palaquium ellipticum ..	445	351	256	119	54	9	11	3	..
Cinnamomum species ..	65	68	45	23	24	8	3	3	..
Eleocarpus species	24	24	31	14	6	3	1	..	..
Cedrela toona	2	5	2	..	2	..	..	..	..
Calophyllum trapaezifolium.	73	47	39	13	8	1	6	2	1
Pygiun wightianum	10	12	12	4	2	..	..	..	..
Canarium strictum	19	11	1	4	1	1	6	2	..
Diospyros species	119	87	21	9	3	1	..	..	..
Artocarpus integrifolia ..	24	15	9	5	1	..	..	..	..
Aglaia roxburghiana	18	6	4	6	2	1	1	..	..
Cullenia excelsa	186	268	317	159	98	56	24	5	..
Dysoxylum malabaricum ..	58	32	12	6	..	..	1	1	..
Pterospermum	5	4	1	1	..	..	..	..	..
Anaclosa densiflora	8	5	1	..	..	..	..	..	..
Nephelium longana	68	53	28	8	5	1	..	..	..
Vitex altissima	18	12	3	3	1	1	..	..	..
Filicum decipiens	..	3	2	..	..	..	..	..	..
Hardwickia pinata	7	3	4	..	..	1	1	..	..
Bischofia javanica	5	2	..	5	..	..	1	..	..

Cox's Hut Block

Workable area—880 acres. Enumarated **area—44** acres.

Species.	*Girth class in feet.*								
	3–4	4–5	5–6	6–7	7–8	8–9	9–10	10–11	Above 11
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)
Mesua ferrea	45	49	59	47	37	24	6	7	2
Balanocarpus utilis	8	8	7	7	7	2	..	..	..
Gluta travancorica	4	3	4	4	5	5	..	..	..
Eugenia species	13	15	17	12	2	3	3	4	..
Palaquium ellipticum ..	62	73	66	38	27	12	1	..	..
Cinnamomum species ..	..	7	7	9	8	2	..	1	1
Elaeocarpus species	17	20	13	8	9	4	4	6	..
Cedrela toona	..	..	..	1	1	..	..	..	..
Heritera papilio	22	14	10	8	7	..	..	..	2
Calophyllum trapaezifolium ..	10	7	..	1	..	2	..	..	..
Pygium wightiamum	1	4	1	2	1	..	..	..	..
Canarium strictum	2	4	6	2	1	1	3	..	2
Dyospyros species	64	56	26	13	8	5	..	..	..
Artocarpus integrifolia ..	..	7	3	..	..	..	..	..	..
Aglaia roxburghiana	9	12	13	11	6	2	..	2	..
Cullenia excelsa	45	51	116	71	72	32	8	7	5
Pterospermum	11	12	5	4	2	2	1	1	..
Anaclosa densiflora	3	4	..	3	1	..	..	..	..
Nephelium longana	33	34	26	6	5	..	..	..	..
Vitex altissima	1	1	4	1	2	..	1	..	..
Filicum decipiens	3	6	2	2	1	..	..	..	..
Hardwickia pinnata	15	11	5	2	3	1	..	1	..
Bischofia javanica	2	2	2	5	2	..	..	1	..
Mangifera indica	29	38	29	23	22	14	9	15	17
Hopea parviflora	..	3	..	1	..	..	..	..	..

Knapp's Hut Block

Forest area—660 acres. Enumerated area—33 acres.

Species.	*Girth classes in feet.*				
	3–4	4–5	5–6	6–7	Over 7
(1)	(2)	(3)	(4)	(5)	(6)
Palaquium ellipticum ..	32	36	68	43	124
Cullenia excelsa	15	14	43	28	136
Canarium strictum	3	2	6	3	23
Mesua ferrea	3	7	39	14	43
Nephelium longana	2	3	3	..	2
Elaeocarpus species	15	5	12	3	10
Dysoxylum malabaricum ..	14	13	11	12	21
Aglaia roxburghiana	1	..	1	..	..
Artocarpus integrifolia ..	4	3	3	1	1
Calophyllum trapaezifolium.	7	7	2	2	1
Gluta travancorica	4	5	3	2	14
Eugenia species	5	5	8	1	11
Diospyros species	15	22	15	6	9
Bischofia javanica	1	..	..	..	2
Mangifera indica	..	1	..	..	1
Pterospermum species ..	..	..	..	..	1
Anaclosa densiflora	1	1	..	..	..

292. *Teak.*—The peculiar features of growth and phenology exhibited by the local variety to teak along the foot hills have already been described in paragraph (?). A list of teak plantations in the division with their mean height and mean girth is given in Appendix (?). The mean heights and girths plotted separately on square papers against age gave the following results :—

(1) In growth, the plantations in Kuttalam range show a different trend from those in Ambasamudram range.

(2) The height and girth increment is definitely superior for, Kuttalam teak. This difference is marked in girth increment but not so in height growth.

The poorer growth in height and markedly so in girth of the teak plantations in Ambasamudram range can be attributed to the heavy invasion of semi-evergreen underwood and probably to bad origin of seeds.

(3) The general site quality varies between All India (Revised) low III quality and a high IV quality. But surprisingly, the girth is definitely too good for that quality inspite of the plantations having been thinned very lightly. This point is illustrated by the following statement :—

Details.	*Yield table figures for D. Grade.*	*Kuttalam figures.*	*Ambasamudram figures.*
Age	30	30	30
Height in feet	50	50	43
Quality class	05 III	0·5 III	1·8 IV
D. B. H. inches	12·7	12·7	9·0

293. From the smooth curves drawn with heights and girths against age, the following local table is constructed ;—

Age	*Kuttalam teak.*			*Ambasamudram teak.*		
	Height in feet.	*Girth in inches.*	*Diameter in inches.*	*Height in feet.*	*Girth in inches.*	*Diameter in inches.*
5	19	9	2·9	13	6	1·9
10	27	18	5·7	22	12	3·8
15	35	25	8·0	30	17	5·4
20	40	31	9·9	35	21	6·7
25	46	37	11·8	39	25	8·0
30	50	40	12·7	43	28	9·0
35	54	43	13·7	47	31	9·8
40	57	46	14·6	50	33	10·5

294. Assuming that the thinning intensity will be constant, it is reasonable to expect in 40 years a pole crop of about 53 feet in height and 39 inches in girth, on an average. Generally, at the age of 11 teak attains half the height it will reach at forty years, and this principle can be taken as a rough guide to judge the future performance of all teak plantations.

295. *Fuel Forests.*—The yield from fuel coupes widely varies from series to series, and from coupe to coupe within the same series. The yield figures furnished by the lessee are always an ocular estimate and so inaccurate as to be of no use for any analysis.

296. *Eta Reed.*—Confined chiefly to the interior regions of Papanasam, Kuttalam and Puliyara reserved Forests, the reed growth is formed by three species of Ochlandra namely, *Ochlandra travancorica*, *Ochlandra brandisii* and *Ochlandra rheedii*, of which the first two attain a girth of six inches and a height of 25 feet, while the last one reaches only a third of the size. The gross area covered by reeds is about 40 square miles.

297. In connection with statewide survey of raw materials for paper pulp the working plan party undertook a survey and stock map of the reed areas in the division. In their mode of occurrence, reeds exhibit three grades of incidence.

(i) *Pure reeds.*—To the exclusion of all other species except for an occasional isolated tree peeping out of a sea of reeds, pure reed extends over about 12 square miles (7,720 acres) adjoining the Kerala border. Most of this category lies in Papanasam Reserve Forest.

(ii) *Predominantly reed.*—Reed occurs as a mixture with sholas, but the latter are in a subordinate and integrating stage giving the impression as if they are going to be pushed out by the reeds in course of time. Seventy-five per cent of the growth is reeds and the area covered by this grade is nearly 22 aquare miles (13,850 acres). confined almost entirely to Papanasam Reserve Forest.

(iii) *Scattered reed.*—In the lower limits, i.e. at 3,000 to 3,500 feet elevation reed grows as an undergrowth in the sholas. It is not so luxuriant as in the other two types but the clums have a tendency to be thim and lanky reaching, sometimes, a height of 30 feet.

In such areas extraction may not be easy, since reeds form only 30 per cent of the grass area, which is 6 square miles)3,800 acres) and lie chiefly in Papanasam and Puliyara Reserve Forest.

298. The following table shows the distribution of reed areas :—

Range.	*Name of forest.*		*Pure reed in acres.*	*75 per cent reed in acre.*	*30 per cent reed in acres.*
Ambasamudram	Papanasam	R F	6,800	11 300	2,400
Kuttalam	Kuttalam	R.F	800	1,150	309
Shencottah	Puliyara	R.F	120	1,400	1,100
	Total acres ..	..	7,720	13,850	3,809
	Total square miles	..	12	22	6

	ACRES.
Effective pure reed area stock of	7,720
Effective 75 per cent of 13,850 acres	10,387
Effective 80 per cent stock of 3,800 acres	1,140
	19,247
	19,000

Total effective reed area—19,000 acres.

299. In 1926, two acres of pure reed area when clearfelled, gave $17\frac{1}{2}$ tons of green reeds or $11\frac{1}{2}$ tons of air dry reeds. This means an acre yields 5·75 tons of air dry reeds.

300. It has long been known that reeds make excellant paper pulp and high quality printing paper because of their slender and exceptionally long fibre. In the neighbouring Kerala State, at Punalur, a paper mill is flourishing on the reed resources of the State forests. The reed areas, which are similar to those of the reed areas of this division, are worked on a four year cycle in Kerala State. On the same basis and rotation, an effective area of 4,750 acres will be available annually for exploitation.

· 4,750 by 575 = 27,312 tons of air dry reeds per year.

As a conservative estimate after allowing some margin for unforeseen contingencies, the annual yield may be taken as about 25,000 tons of air dry reed. This may be sufficient for a small paper mill, which can be located either at Kariar or Mundanthorai or Papanasam. Electricity, plentiful and perennial flow of water from the reservoir, a good network of bridle paths leading to the reed areas and a good metalled road and bus service to Kariar make the prospects of a paper mill very bright.

301. *Bamboo.*—Natural bamboo (*Bambusa arundinacea*) in exploitable quantities occurs in part of Kuttalam Reserve Forest and the adjoining Puliyara Reserve Forest. A stock map of the bamboos was prepared showing three grades of density namely *scattered*, *sparse* and *dense*; no enumeration was done in a systematic manner as it is not an important produce for this division. Wherever the bamboos are less than ten clumps per acre, it is shown as *scattered*; if it is 10 to 19 clumps per acre, it is shown as *sparse*, and areas containing 20 and more clums per acre are classed as dense areas.

302. The following statement shows the distribution of bamboo areas :—

Range.	*Name of R. F.*		*Gross area in acres.*	*Effective area in acres.*
Kuttalam	Kuttalam	R.F.	4,472	275
Shencottah	Puliyara	R.F	10,930	1,765
	Total	.. ..	15,402	2,040

303. The total bamboo area in the division is 15,401 acres which works out to an effective area of 2,040 acres.

PART II.

Future Management Discussed and Prescribed.

CHAPTER I—BASIS OF PROPOSALS.

SECTION 1—GENERAL OBJECTS OF MANAGEMENT.

304. This working plan covers the Tirunelveli North Forest Division as constituted from 1956, but excludes that portion of Singampatty forest which is already covered by the prescriptions of the Tirunelveli South Working Plan. The various objects of management, briefly stated are as follows :—

(i) To raise more of teak plantations and to tend the existing ones in order to meet the demand for electrict transmission poles and the like.

(ii) To grow matchwood plantations so as to feed, the match factories in and around the district.

(iii) To preserve the sholas that lie in the catchment area of Thambaraparni river and other smaller rivers with a view to regulating the flow of water into reservoirs.

(iv) To supply firewood and small timber to the people in towns and villages of the district and to improve the growing stock.

(v) To extract the dead sandal trees and to raise sandal plantations.

(vi) To work on a regular felling cycle the bamboos found in Kuttalam and Shencottah ranges.

(vii) To exploit the minor forest produce in all the ranges.

(viii) To provide grazing facilities to cattle that depend on the forests.

(ix) To protect the forest against fire.

(x) To improve the accommodation and communication facilities of the division.

(xi) To aim at maximum financial return per acre of forest consistent with principles of forestry.

SECTION 2—METHOD OF TREATMENT.

305. The methods of treatment to be adopted vary with each working circle and the details are given under each working circle. Prescriptions and suggestions not covered by the different working circles are embodied in the chapter on 'Miscellaneous Regulations'.

306. Generally, all exploitation will be got done through contractors as at present since this has given the most satisfactory results. But, all tending and planting operations and the clearfelling of teak plantations will be done departmentally in order to ensure that they are done in time and to the required standard.

SECTION 3—WORKING CIRCLES AND THEIR CONSTITUTION.

307. In conformity with the objects of management, eight working circles have been constituted. The following statement shows the various working circles and their areas :—

Name of working circle.	*Area in acres.*
1 The Teak Working Circle	2,620
2 The Matchwood Working Circle	5,590
3 The Fuel Working Circle	22,123
4 The Timber *cum* Fuel Working Circle	11,192
5 The Sandalwood Working Circle	1,045
6 The Bamboo Working Circle	14,630
7 The Minor Forest Produce Working Circle	2,06,451
8 The Afforestation Working Circle	2,402

SECTION 4—PERIOD OF THE WORKING PLAN.

308. The working plan will be in force for a period of ten years from 1st April 1961 to 31st March 1971. However, indications regarding the areas to be worked for another five years are also made in the plan to come in handy in case the next revision of the plan does not come off in time.

CHAPTER II—WORKING PLAN FOR THE TEAK WORKING CIRCLE.

SECTION 1—GENERAL CONSTITUTION OF THE WORKING CIRCLE.

309. The Teak Working Circle includes all the existing teak plantations of the division and the area proposed for conversion into teak plantations during the working plan period. But a few plantations that either failed or deteriorated badly have been excluded from the working circle since it will not be economical to give them any salvaging treatment. A list of the plantations can be found in Appendix V.

310. The total area of this working circle is 2,620 acres, of which 1,591 acres are covered by the existing plantations and the remaining 1,029 acres represent the area set apart for conversion.

SECTION 2—DIVISION OF THE AREA.

311. All the teak plantations are situated in Ambasamudram, Kuttalam and Shencottah ranges, of which only those in Kuttalam Range are in a compact locality and were planted continuously from 1931. In the other ranges it was not so, with the result the plantations do not lend themselves for grouping into more than one series.

312. Though the system of calling localities by compartment numbers is not in vogue, there has been no difficulty in identifying plantations by their local names; therefore, the compartment system will not be introduced in this working plan.

313. The site selected for conversion is the Pattavarayankoil forest, lying to the south-east of Mundanthorai bungalow in Ambasamudram Range. The entire area of 1,029 acres will be brought under teak plantations during the ten year period by taking up roughly 100 acres per year. It has the vantage of being very close to Mundanthorai forest colony for easy supervision and of a road from Manimuthar side for easy working of the area.

314. Detailed maps showing the plantations and areas to be worked are added to the working plan.

SECTION 3—ANALYSIS OF THE CROP.

315. Although teak planting in the division commenced in 1912, it was not continued systematically, and no attempt was made to create a regular series. Since the general performance of teak in the division is not very much, quality class of plantations was assessed by computing the mean heights of ten representative trees in each plantation, giving due regard to the variation in growth within the plantation itself. The best plantation is that of 1941 in Kuttalam range.

316. In selecting sites for teak planting, areas containing *Randia dumatorum*, *Zizyphus xylopyrus and Careya arborea* have been discarded as they indicate swampy or ill-drained localities. Presence of large number of natural teak trees of good height growth and of a few *Stereosperumum chelonoides*, rosewood and *Grewia tilaefolia* is taken as a pointer to localities suitable for teak.

317. In this respect the Pattavarayankoil forest, which is to be converted into teak plantations, can be regarded as the best in the division. The soil is a pale brown, sandy loam extending up to a depth of 8 feet with a gentle slope to the north; natural teak of 2 to 3 feet in girth and 40 to 50 feet in height grows gregariously. *Stereospermum chelanoides*, *Grewia tiaefolia*, *Feronia elephantum*, rosewood, *Helicters isora*, etc., are the other associates. In the past, it was annually burnt by fires that escaped from the adjoining Singampatty ex-estate forests, and the result is now there is lot of lemon grass growing. Here and there, a few teak seedlings of natural regeneration have managed to hold the ground. On the whole, there is very little of undergrowth, probably due to the fires.

SECTION 4—METHOD OF TREATMENT.

318. As the most popular timber, teak always finds a ready market in the district and its surrounds, and in fact timber from Kerala State has to come in to meet the requirements. Of late, new customers like the Electricity and Highways departments have begun to place heavy indents for teak poles. There is a general increase in the consumption of teak and it will reasonable to assume that inspite of revolutionary products like hard-boards, chipboards, etc., natural produce will continue to command its price. The teak that grows here is of third and fourth quality (revised tables) and yet the amount it fetches is so great as to make teak planting the most lucrative proposition.

319. Our object is not to raise a high quality teak as in Nilambur or other places of west coast, but to grow a low quality crop as nature permits and the market wants. The treatment proposed is to clearfell about 100 acres annually, remove all valuable produce, burn the leftovers and plant up the area with teak. The planting programme is in keeping wit hthe five-year plan schemes and the aim is to attempt the conversion to economic plantations quickly in order to improve the growing stock of the forests as early as practicable. Concurrently, the existing plantations that attain maturity will be replaced by a new crop after clearfelling.

320. *Sivicultural System.*—The sivicultural system to be adopted in this working circle is the clearfelling system, by which a mixed deciduous forest and the existing plantations will be clearfelled and converted into even-aged teak plantations by concentrated artificial regeneration, resulting in a complete series of all age gradations.

321. *Rotation.*—Judged by top height, the teak plantations of the division fall between a high IV quality and a low III quality, according to revised All India Yield tables. This corresponds to a high V quality and low IV quality of the original yield tables by M. V. Laurie. However, the diameter increment of these plantations is too good for the quality inspite of the thinnings being light and irregular.

322. Under the five-year plans teak is being planted in the state at an accelerated pace with the ardent hope of meeting the local demands at an early date. This factor, therefore, rules out a long rotation which is usually adopted for big size timber. Secondly, the tendency of teak in this region is not to put on any appreciable height increment after 40 years. Thirdly, at present there is a keen demand for electric transmission poles from the electricity department and for short poles from the Highways Department. The trend of the local growth is to reach a girth of 36 inches in 40 years.

323. In view of these considerations, the rotation for teak in this region is fixed at 40 years.

324. *Choice of species.*—Teak will be planted over the entire area taken up for regeneration year after year. But there is a small swampy patch stretching along the centre of Pattavarayankoil forest; this may be planted with *Eucalyptus rudis* or *Eucalyptus hybrid* or *Eucalyptus rostrata* when the coupes surrounding it are planted with teak.

325. *Regulation of yield.*—The object is to get a more or less even series of age gradations ultimately and to bring the scattered plantations under a convenient schedule of working. Some of the existing plantations raised in the early days offer difficulty in regulating yield by area due to the variations in their extent.

SECTION 5—METHOD OF EXECUTING THE FELLINGS.

326. All areas which are to be clearfelled for conversion into teak will be exploited through contractors by sale in public auction. The coupe of the year will be sold as a single lease unit and the lease period will be one year from 1st January. All trees of teak, rosewood and vengai measuring 18 inches and over in girth at breast height will be enumerated and numbered after blazing. The probable length of merchantable bole will also be estimated. The volume of probable outturn may then be estimated with the quarter girth volume table and a form factor of 0.68, so that it helps the seller and buyer to judge the value of coupes.

327. The survey, demarcation and enumeration should be completed before the end of October preceding the year of exploitation.

328. The area shall be clearfelled of all growth and all utilisable produce may be removed by the contractor. In order to have enough material for a good burn, it is advisable to compel the lessee to leave all materials of less than six inches in girth.

329. In the event of not getting a suitable price at the auction, the valuable species like teak and rosewood should be exploited departmentally before the end of August and the remaining growth sold in auction for clearfelling, within a five month lease from 1st September to end of January.

330. All plantations which are to be felled and planted will be exploited departmentally. Commencing from the 1st of Apr,l, all saleable trees of teak should be felled departmentally and moved out of the site before the end of August.

331. *Logging.*—To ensure only the minimum of wastage this work, should be entrusted to a good Forester. Only saws should be used to cut across the logs and poles.

332. All saleable logs and poles, on conversion, should be chisel numbered. The year of felling, coupe number, species, tree number (which should be the same as enumeration number) and log letter (A, B, C, etc., for butt, second and third piece respectively) will be chiselled on each piece. Simultaneously, the Forester in charge should affix his hammer mark on each piece.

333. Poles of less than 4 inches in diameter at the butt end need not be chisel numbered with the details. It will suffice to chisel the grade only.

334. Soon after conversion, the timber should be dragged to road-side forest depots and stacked under shade, outside the coupe limits. Timber, other than that earmarked for government departments, should be sold out in auction just after the work is over, preferably in September–October of the same year. Felling, conversion and transport to roadside depots will be done departmentally.

335. The classification and grading of timber are as follows :—

TEAK—(i) T.R. (Teak Round, 'A' Class Straight and Sound) Logs 8 feet and up in length.

T.R. I—Sixty inches and up in mid-girth.
T.R. II—Forty-eight inches to 59 inches in mid-girth.
T.R. III—Thirty-five inches to 47 inches in mid-girth.

(ii) T.R.B. (Teak round—'B' Class)—Log 8 feet and up in length with minor defects.

T.R.B. I—Sixty inches and up in mid-girth.
T.R.B. II—Forty-eigtht inches to 59 inches in mid-girth.
T.R.B. III—36 inches to 47 inches in mid-girth.

(iii) T.R.C. (Teak round, ' C ' class)—Logs 8 feet and up in length not qualifiing for the A and B class. Usually logs with bad shape and major defects fall under this class.

T.R.C. I—Sixty inches and up in mid-girth.

T.R.C. II—Forty-eight inches to 59 inches in mid-girth.

T.R.C. III—Thirty-six inches to 47 inches in mid-girth.

(iv) T.R.S.L. (Teak Round short logs)—Logs between 4 feet and 7 feet 9 inches in length and 36 inches and above in girth.

T.P. (Teak poles) T.P.I. and T.P. II classes are measured as in the case of logs. But in the case of T.P. III, T.P. IV, T.P.C. and T.P.U.S. Class a standard volume of 2 cubic feet, 1.5 cubic feet and 0.75 cubic foot respectively is adopted for accounting purposes.

T.P. 1—Teak poles 15 feet and up in length and 24 to 35 inches in mid-girth.

T.P. II—Teak Poles 10 feet to 15 feet in length and 24 to 35 inches in mid-girth.

T.P. III—Teak Poles 15 feet and up in length and 12 to 35 inches in mid-girth.

T.P. IV—Teak poles 10 feet to 15 feet in length and 12 to 35 inches in mid-girth.

T.P.C.—Teak poles 12 to 35 inches in mid-girth and not qualifying to any of the four classes mentioned above.

T.P.U.S.—Teak poles undersized 10 feet and up in length 9 inches in mid-girth.

NOTE.—Teak logs are not rough squared at present. If they are squared, the corresponding classes will be T.A. I, T.A. II, T.A. III, T.B. I, T.B. II, T.B. III, T.C. I and T.C. II according to the girth and the length specifications given for the round logs detailed above.

The classification for poles for overhead transmission line will be as follows :—

TABLE I.

Details.	*Length.*	*Minimum diameter at top.*	*Minimum diameter at bottom.*
Top piece	(*a*) 10 to 12 feet	4 inches	5 inches to 6 inches
	(*b*) 14 to 16 feet	4 inches	5 inches to 6 inches
Bottom piece	14 to 16 feet	5 to 6 inches	8 inches to 10 inches

TABLE II.

Details.	*Length.*	*Minimum diameter at top.*	*Minimum diameter at bottom.*
	28 to 30 feet	4 inches	8 inches to 10 inches

The measurement will be under bark and due allowance should be made for shrinkage.

SECTION 6—TABULAR STATEMENT OF FELLINGS.

336. The following are the areas to be clearfelled and converted into teak plantations during the plan period :—

Year of felling.	*Area in acres.*	*Locality.*	*Coupe number.*
1961–62	95	Mundanthorai	I
1962–63	112	Mundanthorai	II
1963–64	102	Mundanthorai	III
1964–65	88	Mundanthorai	IV
1965–66	97	Mundanthorai	V
1966–67	106	Mundanthorai	VI
1967–68	108	Mundanthorai	VII
1968–69	112	Mundanthorai	VIII
1969–70	104	Mundanthorai	IX
1970–71	105	Mundanthorai	X

337. The above areas to be planted annually are marked in the working plan map.

338. The plantations of 1922, 1923 and 1924 at Servaiar are so poor in growth and stocking that it will not be worthwhile to fell them in the near future. Therefore, these will be planted after exhausting the area available near Mundanthorai. It will not affect the yield regulation, but helps to secure a proper series, when felling of plantations are commenced the total area taken for felling in any one year will be approximately 1/40th of the total area of the Working Circle.

SECTION 7—REGENERATION.

339. *Clearing and burning.*—In February, when all the saleable materials had been removed, the remaining growth should be clearfelled and left to dry scattered evenly over the area.

340. Along with this all grass bushes shall be up-rooted and heaped in piles to be burnt later. The success of the plantations to be raised by conversion depends upon the thoroughness of this job.

341. In March the slass will be burnt. Any material left unburnt will be billetted, heaped over the unburnt patches and burnt again. The aim should be to get a good uniform burn over the area, and care should be taken to see that the fire does not escape and burn the surrounding forest.

342. *Aligning ani staking.*—In view of the low site quality, espacement will continue to be six feet by six feet. Stakes 12 to 15 inches long may be used. This work should be completed by mid May so that, when rain falls, planting can be done promptly.

343. *Planting.*—One year old stumps of 4 inches to 8 inches in diameter at the collar prepared from nursery seedlings will be planted out in crow-bar holes with the onset of premonsoon showers, when the ground is sufficiently soft.

344. The crowbars should have been sharpened before planting is undertaken, for neglect of this small precaution has its repercussions.

345. Planting season for this region will be from 15th May to the first week of June, depending on the monsoon. Stumps should be planted flush with ground level. Experiments have proved this to be the best method as it prevents desiccation of stumps in case of long break in the monsoon immediately follows planting. Stumps should always be put in to one definite side of the stake.

346. Planting should be quick and must be completed within a week, for, dilatory planting spread over longer periods loses the benefit of time and early rains.

347. *Casualities.*—Wherever stumps failed to sprout even four weeks after planting, new stumps should be put in atonce. Since the monsoon sets in by this time, bigger stumps can also be used and planting should be flush with ground level. This replacement of casualities should constantly be repeated till cent per cent stocking is achieved by July. All casualities may be replaced in the second year.

348. *Clipping multiple shoots.*—A sprouting stump throws two to four shoots. When they are about three inches high, leaving the tallest shoot the others should be clipped off a sharp pen-knife without bruising the plant.

349. Swampy patches inside the area will not be planted with teak, but with six month old seedlings of Eucalyptus species at the same espacement. Before planting, all grasses should be scraped off to a radius of 1½ feet. The District Forest Officer may plant any other suitable species he desires.

350. Between two adjacent plantations a 12 feet wide strip should be left unplanted so that it stays as a boundry line and inspection path for future.

351. *Kumri.*—No departmental kumri will be undertaken. But the planting area may be given to the Kanis and other people for two or three years to grow tapioca, sweet potato, chillies, etc., between the teak plants. None of the silvicultural operations like planting, weeding, etc., need be done by the kumridars, for they never do them in time nor according to requirements. The damaged suffered by plantations is not worth the few rupees apparently saved by their free labour. If the kumridars are indigent to pay for the cultivation, it will be profitable for the teak plants to allow free kumri.

352. *First year weeding.*—There will be three weedings in the first year. Success of a plantation depends on this and therefore this work should be carried out in time. The first weeding in August will be to scrap off weeds to a radius of one foot all round second weeding in October also to scrap off weeds with a spade to a radius of one foot all round the plant; third weeding to be done in December–January in the same manner, but the soil also should be worked to a depth of 3 to 4 inches.

353. At no time should the kumri crop be allowed to over-top or interfere with the teak plants. If no kumri crop is raised, all the weeding and soil working will be done to a radius of one and half feet. Deep forking need not be done since scraping to a depth of half an inch with a spade produces the same effect.

354. *Second year weeding.*—There will be two weedings and tending in the second year. If synchronised with the ascent of sap and growth activity of the plants and the pre-monsoon showers, the effect of weeding is remarkable. The first weeding, therefore will be in May and consist of clean scraping with spade to a radius of 1½ feet Climbers and multiple teak shoots should be cut. Damaged teak will be cut back.

355. No primary will be done as it has been proved experimentally that it does not confer benefit. Miscellaneous species interfering or over-topping teak should be cut down.

356. The second weeding will be given only to plants less than four feet in height and will include soil working to a depth of three inches. To be done in August. Climbers also will be cut.

357. If, due to poor growth in a plantation, the District Forest Officer feels an additional weeding is necessary in the first or second year, he may do it with the approval of the Conservator.

358. *Third year tending.*—Whether a kumri crop was raised or not in the past, two tendings, will be given in the third year. To be done in May-June, the first will consist of cutting all climbers and cutting down all miscellaneous species interfering with teak. Like-wise the second tending will be given in December.

359. *Nursery.*—Temporary nurseries, preferably within the current regeneration area, will be raised with beds of 40 feet by 4 feet after digging the ground to 18 inches and removing all roots and stumps. Before this, the site will be given a good burn.

360. The nursery will be fenced.

361. The sides of beds will be supported by pegs and split bamboos or other suitable materials. Between the beds a two feet wide path should be left. By mid April, seeds at 25 pounds per bed will be sown and covered with fine soil to a depth equal to the thickness of seed. Over this will be laid a layer of twigs and then a layer of straw. Beds should be watered it there is no rain, and the twigs and straw removed as soon as signs of uniform germination become apparent. It must be noted that premature removal of the cover results in irregular stocking and belated removed in damage to seedlings.

362. One standard bed gives enough stumps to plant and replace casualties over one acre. But every year there is always a last minute demand for stumps from other divisions. Therefore an extra ten beds shall be raised.

363. In view of the peculiar features of the local teak described in paragraph 75, seeds from it should not be collected. These seeds ripen in April-May, whereas those from the normal teak ripen and fall down in November-January. Therefore, as a simple rule, no seeds should be collected before November and after January, and seeds should be collected only from the Kuttalam plantations over 25 years of age or from selected mother trees in natural forests. Normally a bag of seeds (55 pounds) will serve two beds.

364. To plant up swampy patches, one bed of *Eucalyptus* seedlings will be raised by sowing the seeds in October.

SECTION 8—SUBSIDIARY SILVICULTURAL REGULATIONS.

365. *Thinnings.*—The general principle to be observed with teak grown for timber is that early thinnings should be heavier and more frequent than later thinnings since the response of opening out is better in young crops. Also to provide space and time to grow into large sizes, thinnings are completed by mid-rotation. But the treatment aimed at a pole crop has to be so modified as to produce straight cylindrical stems of a larger number but inevitably of a smaller diameter. Consequently, the thinnings have to be light and extend beyond mid rotation. Also, in its early age teak is very susceptible to suppression and competition. Harm done by failure to thin is greater than that done by over thinning.

366. In applying these principles it has to be borne in mind that, for a given site quality and intensity of thinning, teak in this division puts on much greater diameter growth than that given in the revised yield ables. In other words, though the intensity and frequency of thinnings have been temperate almost nearing inadequacy, the diameter growth is high and corresponds to what it would be if the thinnings were heavier by one grade. This property comes in handy when we desire to grow a pole crop, for, we can afford to retain a larger number of stems per acre at the final thinning without fear of loosing the required diameter growth. It has at the same time the advantage of conditions favourable for a clean and better hole form.

367. Thinnings were hitherto done at five year intervals without any prescribed intensity. However, judged from the spacing in various plantations it can be said to have been one of 'C' grade. Even with this intensity, teak in this division attains a girth of about 36 inches in 40 years. Also, under average conditions the plantation attain an All India Quality Class of 0.5 III. However, to be on the safe side in getting the required diameter growth, a slightly heavier grade of thinning, i.e., C/D grade is adopted in this Working Plan. According to this revised Yield Tables, for this quality class and grade of thinning, at 40 years there should be 125 stems per acre. Allowing a margin of 5 trees per acre for accidents, mortality, etc., after the final thinning, we should in all leave 130 stems per acre after the final thinning.

368. With an initial spacing of 6 feet by 6 feet, the first thinning is usually done when the plants reach a height of about 24 feet so that the spacing of 8½ feet by 8½ feet after thinning corresponds to about one-third of the height of the crop. Under improved weeding techniques and better seed origin, combined with the good alluvial site proposed for planting during the period of this plan, it will be safe to expect the younger plantations to reach this height in about six years. The first thinning will be, therefore done at age 6. It will be a mechanical thinning to reduce the stock to fifty per cent by removing all the plants in a alternate diagonal rows. At this spacing after thinning becomes 8½ feet by 8½ feet. At this very early age differentiation among plants does not set in, and therefore any attempt to do a silvicultural thinning becomes unnecessary.

369. The second thinning will also be a mechanical thinning wherein the stocking is further reduced to fifty per cent by removing all the plants in alternate diagonal rows. This will be done at age 10 when the average height is expected to be about 33 feet. The espacement after thinning becomes 12 feet by 12 feet. At this age the number of stems to be removed is large, differentiation among stems has not set in yet and any under thinning will do irrepairable damage to the crop. For these reasons this thinning will also be mechanical.

370. The third and fourth thinnings will be silvicultural, for, by now individual variations among the poles will have set in and it will not be disirable to expose a small number of poles to mechanical reduction. During thinning, all dead, dying and diseased or moribund trees and suppressed or dominated stemps will be removed. No removal should be made as to cause a lasting gap. The silvicultural thinnings will be done respectively at age 15 and 25. It may be difficult to attain the exact spacing and intensity while marking the thinnings therefore, as a rough guide, it is suggested that marking may be done in such a way as to get an average espacement equal to about one third of the crop height.

371. There will be no thinning after the 25th year and the number of stems to be retained per acre at the final thinning is 130. The first and second mechanical thinnings will be done under the guidance of the Range Officer. The silvicultural thinnings shall be done by the District Forest Officer or his Gazetted Assistant. It is suggested that thinnings marked between July and November when the trees will be in full foliage.

372. The following table illustrates the thinning regime described above :—

Thinnings.	*Age at the time of Thinnings.*	*Average Height in feet.*	*Number of stems per acre to be left after thinning.*	*Average espacement in feet after thinning.*
(1)	(2)	(3)	(4)	(5)
First (Mechanical)	6	24	600	8½
Second (Mechanical)	10	33	300	12
Third (Silvicultural)	15	39	190	15
Fourth (Silvicultural) ..	25	48	130	18

NOTE.—After the final thinning, there is a span of 15 years for diameter increment until the crop is finally felled at age 40.

373. The following statement shows the plantations to be thinned each year in accordance with the thinning cycle :—

Year of thinning.	*Name of plantation.*	*Area in acres.*
(1)	(2)	(3)
1962-63 .. — — ..	Pambuli 1956 ..	15·00
	Kannupuli 1956 ..	50.00
	Krishnapuram 1956 ..	31·00
	Adavikadu 1956 ..	50·00
	Kuttalam 1951 ..	22·00
	Kuttalam 1946 ..	5·00
	Kariar 1946 ..	61·00
	Servaiar 1936 ..	17·50
	Kuttalam 1936 ..	10·00

Year of thinning. (1)	*Name of plantation.* (2)	*Area in acres.* (3)
1963–64	Pambuli 1957	25·00
	Adavikadu 1957	37·00
	Vallam 1957	76·00
	Kuttalam 1952	15·00
	Kariar 1947	20·00
	Kuttalam 1947	5·00
	Kuttalem 1937	10·00
1964–65	Vallam 1958	46·00
	Kannupuli 1958	93·50
	Kuttalam 1953	15·00
	Kariar 1948	20·00
	Kuttalam 1948	5·00
	Kuttalam 1938	10·00
	Servaiar 1938	20·00
1965–66	Kodamadi 1959	28·00
	Vallam 1959	23·00
	V. Melpidagai 1959	27·00
	Adavikadu 1959	46·00
	Koilteri 1954	6·00
	Vallam 1954	34·00
	Kuttalam 1954	15·00
	Kuttalam 1949	15·00
	Kuttalam 1939	10·00
	Servaiar 1939	20·00
1966–67	Adavikadu 1960	161·00
	V. Melpidagai 1960	27·00
	Koilteri 1955	50·00
	Pambuli 1955	16·00
	Kuttalam 1950	15·00
	Kariar 1950	44·76
	Kuttalam 1940	22·00
	Servaiar 1940	20·00
1967–68	Plantations of 1961	..
	Krishnapuram 1956	31·00
	Pambuli 1956	15·00
	Kannupuli 1956	50·00
	Adavikadu 1956	50·00
	Kuttalam 1951	22·00
	Kuttalam 1941	22·00
	Servaiar 1941	21·30
1968–69	Mundanthorai 1962	90·00
	Pambuli 1957	25·00
	Adavikadu 1957	37·00
	Vallam 1957	76·00
	Kuttalam 1952	15·00
	Kuttalam 1942	22·00
	Servaiar 1942	22·50
1969–70	Mundanthorai 1963	112·00
	Vallam 1958	46·00
	Kannupuli 1958	93·50
	Kuttalam 1953	15·00
	Kuttalam 1943	22·00
	Servaiar 1943	21·40
1970–71	Mundanthorai 1964	102·00
	Kodamadi 1959	28·00
	Vallam 1959	23·00
	V. Melpidagai 1959	27·00
	Adavikadu 1959	46·00
	Koilteri 1954	6·00
	Vallam 1954	34·00
	Kuttalam 1954	15·00
	Kuttalam 1944	12·00
	Servaiar 1944	20·30
1971–72	Mundanthorai 1965	88·00
	Adavikadu 1960	161·00
	V. Melpidagai 1960	27·00
	Koilteri 1955	50·00
	Pambuli 1955	16·00
	Neeliammankoil 1945	6·00
	Kuttalam 1945	5·00
	Kariar 1945	22·00
1972–73	Mundanthorai 1966	97·00
	Plantations of 1961	..
	Krishnapuram 1956	31·00
	Pambuli 1956	15·00
	Kannupuli 1956	50·00
	Adavikadu 1956	50·00
	Kuttalam 1946	5·00
	Karaiar 1946	61·00
1973–74	Muudanthorai 1967	106·00
	Mundanthorai 1962	95·00
	Pambuli 1957	25·00
	Adavikadu 1957	37.00
	Vallam 1957	76·00
	Kuttalam 1947	5·00
	Kariar 1947	20·00

Year of thinning. (1)	*Name of Plantation.* (2)	*Area in acres.* (3)
1974–75	Mundanthorai 1968	108·00
	Mundanthorai 1963	112·00
	Vallam 1958	46·00
	Kannupuli 1958	93·50
	Kuttalam 1948	5·00
	Kariar 1948	20·00
1975–76	Mundanthorai 1969	112·00
	Mundanthorai 1964	102·00
	Adavikadu 1959	46·00
	V. Melpidagai 1959	27·00
	Vallam 1959	23·00
	Kodamadi 1959	28·00
	Kuttalam 1949	15·00
1976–77	Mundanthorai 1970	104·00
	Mundanthorai 1965	88·00
	Adavikadu 1960	161·00
	V. Melpidagai 1960	27·00
	Kuttalam 1950	15·00
	Kariar 1950	44·76

SECTION 9—OTHER REGULATIONS.

374. At the salient corner of its periphery, every plantation shall be indicated by plantations boards showing the calendar year of its formation and the area in acres. These boards should be renewed periodically as and when they get worn out.

375. The area of a plantation formed should be found by actual survey of the planted area. A map of each plantation to be formed will be drawn to the scale of 4 inches to a mile and filed with the control form so that it becomes useful at the time of revising this plan.

376. A plantation journal will be maintained for each plantation, wherein the name of the plantation, its location, area, the nature of previous growth, the revenue obtained by clearfelling, the details and cost of formation and further history and record of thinnings will be recorded.

377. *Control.*—The control forms relating to the Working Circle should be posted at the end of every financial year. Specimen forms are given in the Appendix.

CHAPTER III—WORKING PLAN FOR THE MATCHWOOD WORKING CIRCLE.

SECTION 1—GENERAL CONSTITUTION OF THE WORKING CIRCLE.

378. The several match factories in Tirunelveli and Ramnad districts were thriving on the softwood trees locally found in private forests and lands; but the supply at present is so short that they have to look for other inferior species and wood from Kerala State at greater cost. In order to keep this industry fed with a regular supply of wood, we should have plantations. A beginning made in 1956 has shown that matchwood grows well in Ambasamudram range and it is possible to plant in large scale. However, planting in Sivagiri forests of Sankarankoil range has not biven success due to poor organisation, though the natural growth of the species is good in that region also. Hence, this working circle is constituted so that systematic planting of matchwood will meet the requirements of the industry in course of time. *A-ilanthus* excelsa for splints and *Salmalia malabaricuum* for boxes are the species in great demand and both can grow in the division.

379. The total area of the working circle is 5,599 acres, the area already planted up to 1959 being 695 acres. The balance of 4,904 acres will be clearfelled and converted into matchwood plantations in due course.

SECTION 2—DIVISION OF THE AREA.

380. The plantations are situated in compact localities of the Mundanthorai plateau in Ambasamudram range and Sivagiri forest in Sankarankoil range. But, the area in Ambasamudram range is connected by a set of good roads. The future plantations to be raised will also be contiguous to the existing ones rendering themselves easy to form convenient series.

381. The following statement gives particular of existing plantations :—

Year. (1)	*Locality.* (2)	*Range.* (3)	*Area in acres.* (4)
1957	Mundanthorai	Ambasamudram	44
1958	Do.	Do.	68
1959	Do.	Do.	121
1957	Sivagiri	Sankarankoil	44
1958	Do.	Do.	267
1959	Do.	Do.	151

382. The 1956 matchwood plantation in Mylar (Singampatty forest) does not come in this working circle since it is already covered by the Tiirunelveli South Working Plan.

383. This working circle will consist of two series, of which one will lie in Sankarankoil range and the other in Ambasamudram range. They will be known by their respective localities, namely, the Sivagiri series and Padarmalai series. The Sivagiri series comprises 462 acres of plantations already raised and 1,608 acres to be clearfelled and planted. The Padarmalai series covers 233 acres of plantations already raised and 3,296 acres to be planted.

384. The following statement gives particulars of the two felling series constituted under this working circle :—

Name of felling series. (1)	*Range in which situated.* (2)	*Total area in acres.* (3)
1 Padarmalai	Ambasamdram	3,529
2 Sivagiri	Sankarankoil	2,070

385. All the suitable areas in the division have been brought under the working circle for matchwood, so that, when a complete series of all age gradations is built up in each centre, there will be an annual area of about 280 acres for exploitation and regeneration in the division.

SECTION 3—ANALYSIS OF THE CROP.

386. The existing matchwood plantations included under this working circle cover an area of 695 acres. In Ambasamudram range the plantations have been raised with *Ailanthus excelsa* diagonally alternating with *Salmalia malabaricum*, and in Sivagiri forests the species used is only *Ailanthus excelsa*. The espacement adopted is 16½ feet by 16½ feet. Preliminary observations indicate that *Ailanthus excelsa* grows faster than *Salmalia malbaricum* in the early stages, and reaches a height of 15 feet in three years.

387. The annual area taken up for planting in the past has been variable, with the result, the age gradation are uneven. Further, felling and planting have not been systematic in Sankarankoil range, large areas had been clearfelled with the intention of planting, but in execution only half the area had been planted up. However, with the scheme of felling indicated and the treatment prescribed, a complete series of age gradations uniform in area will be built up in each range.

388. The area to be converted into matchwood lies in Padarmalai of Ambasamudram range and Sivagiri forest of Sankarankoil range. The forest is a mixed deciduous type with species listed out in paragraph 72. In the Sivagiri forest there are also many trees of natural *Ailanthus excelsa and Bombax melabaricum*. The latter species has thrown out numerous root suckers wherever pits were dug to plant the former, and now it looks as if they were planted at regular espacement. Weed growth, especially of Lantana, is great in Sivagiri series and to a lesser extent in the Padarmalai series. The soil in Sivagiri series is sandy loam with good drainage. The Padarmalai series gets the benefit og both the monsoons, whereas the Sivagiri series has to depend upon the north-east monsoon alone.

389. Hill tops with rocky outcrops have been left out of the working circle as unfit for planting with matchwood species. However, for administrative convenience, these patches may be included in the coupes to be clearfelled.

SECTION 4—METHOD OF TREATMENT.

390. The treatment proposed is to clearfell annually about 280 acres and plant up the area with matchwood.

391. *Silvicultural system.*—The system adopted in this working circle is clearfelled system by which a mixed deciduous forest is clearfelled and converted into a matchwood forest by artificial regeneration. This will result in a complete serious of all age gradations to give a regular and sustained yield of wood for the match industries.

392. *Choice of species.*—*Ailanthus excelsa* for splints and *Bombax malubaricum* for boxes are the species much sought after by the match industry, and there are suitable areas in the division to grow both of them. Of the two species, *Salmalia malabaricum* requires an annual rainfall of over 45 inches while *Ailanthus excelsa* is able to grow with 30 to 40 inches of rain. Accordingly, *Ailanthus excelsa* will be planted in Sivagiri series and *Salmalia malabaricum* mixed with *Ailanthus excelsa* will be planted in Padarmalai series. The performance of these species in the plantations so far raised in so good that large scale plantations can be raised without difficulty.

393. *Rotation.*—In the absence of the information on growth trends for the locality, reliance has to placed on observation and the general rule applied to softwoods. Trees of *Ailanthus excelsa* in three-years old plantations have already attained a girth of 12 to 18 inches and *Salmalia malabaricum* a girth of 10 to 15 inches. Considering the fact that *Salmalia malaburicum* grows rather slow in the first few years and later on grows very fast, there will not be appreciable difference in the size of the two species at rotation age. To attain a size of 5 to 6 feet in girth it takes 20 years for the species, and any log over 2 feet in girth is accepted by the factories. Considering all these factors, the rotation is tentatively fixed as 20 years, leaving the question to be finalised at the next revision in the light of experience that would have been gained.

394. *Espacement.*—The espacement adopted so far is 16½ feet by 16½ for Padarmalai series and 12 feet by 12 feet for Sivagiri series, as the rate of growth in the former is better than the latter. Measurements taken in a three-year old plantation of Padarmalai series reveal a crown width 12 to 16 feet even at this early age for *Ailanthus excelsa*. This confirms that the espacement of 16½ feet by 16½ feet is not very wide is far as Padarmalai series is concerned and there is no risk of the ground being left open for a long time. Neither the risk nor the competition from weeds can be a danger when Kumri cultivation is allowed for one or two years, for, by then the plants will be well above that level. Therefore an espacement of 16½ feet by 16½ feet for Padamalai series and 12 feet by 12 feet for Sivagiri series will be adopted.

395. *Regulation of yield.*—With the object of getting an even series of all age gradations at the end of the conversion period, planting will be done over approximately equal areas every year. Regulation of yield will, therefore, be by area.

396. An average yield of about 2,500 cubic feet is matchwood per acre is expected when the plantation is felled. At the end of the rotation, with about 280 acres available annually for felling and planting, there will be an annual outturn of 7 lakhs of cubic feet of matchwood.

SECTION 5—METHOD OF EXECUTING THE FELLINGS.

397. All areas to be clearfelled and converted into matchwood plantations will be exploited through the agency of contractors. The area will be sold in auction in the month of January or February preceeding the year of exploitation. For this purpose, survey and demarcation of the areas will be completed by October.

398. The area to be clearfelled annually in the Padarmalai series is about 185 acres, which is too much to be worked by one contractor. The District Forest Officer, will, therefore, split up the area into approximately equal areas before the sale is advertised. The planting season for this series starts from the middle of May; therefore, the lease period will be twelve months from 1st April to 31st March.

399. In the Sivagiri seres, the annual area to be clearfeled is about 100 acres and the planting season is only October. The entire annual area will be sold as one lease unit. The lease period will be from 1st April to 31st March.

400. All growth, except *sandal* trees, will be clearfelled and removed by contractor. However, in order to leave materials for a burn, it will be obligatory on the part of the contractor not to remove materials of less than six inches in girth. Should the contractor so desire, he may uproot and remove the stumps as well, for, it leaves a cleaner planting side.

401. Clear felling of the standing growth in the planting area will be done through the agency of contractors. If no contractor is forthcoming, departmental exploitation will be undertaken.

SECTION 6—TABULAR STATEMENT OF FELLINGS.

402. Rocky areas, unfit for working, are marked in the maps accompanying this plan. However, some of the patches are included for felling but excluded for planting in the interest of protection.

403. The following are the areas to be clearfelled and planted with the matchwood in the Padarmalai series:—

Year of felling.	*Coupe number.*		*Area in acres to be felled.*	*Area in acres to be planted.*	*Year of planting.*
(1)	(2)		(3)	(4)	(5)
1959–60	Padarmalai	I	143	143	1960
1960–61	Do.	II	180	152	1961
1961–62	Do.	III	212	174	1962
1962–63	Do.	IV	197	180	1963

Year of felling. (1)	*Conpe number.* (2)		*Area in acres to be felled.* (3)	*Area in acres to be planted.* (4)	*Year of planting.* (5)
1963–64	Padarmalai	V	176	176	1964
1964–65	Do.	VI	198	174	1965
1965–66	Do.	VII	213	183	1966
1966–67	Do.	VIII	175	175	1967
1967–68	Do.	IX	166	166	1968
1968–69	Do.	X	176	176	1969
1969–70	Do.	XI	194	194	1970
1970–71	Do.	XII	191	191	1971
1971–72	Do. ..	XIII	214	186	1972
1972–73	Do.	XIV	175	175	1973
1973–74	Do.	XV	170	170	1974
1974–75	Do.	XVI	186	186	1975
1975–76	Do.	XVII	173	173	1976
1976–77	Do.	XVIII	170	162	1977
1977–78	Do. ..	XIX	177	160	1978
1978–79	Do.	XX	233	233	1979

404. In the year after clearfelling, the areas will be planted up. All the areas to be clearfelled, and the patches to be left unplanted are marked in the working plan map. In order to make the age gradation even and regular, plantations raised in 1957, 1958 and 1959 are allotted to coupe XX for final felling 1978–79 and replanting in 1979. In Padarmalai series there are 233 acres of plantation already raised, and out of 3,486 acres destined to be clearfelled only 3,296 acres are fit for planting.

405. Under Sivagiri series, between 1957 and 1959 an area of 1,100 acres was clearfelled, but the planted area is only 462 acres and stocking is very poor. This indicates that a large planting target is too much for this locality. The prescription, therefore, is to plant 100 acres annually in Sivagiri series.

406. Apart from the 462 acres planted in Sivagiri series, another 1,608 acres of plantable areas are available in the series. An annual area of 100 acres will be clearfelled and planted up from 1960. The failed portions of the existing plantations, which are considerable, will be taken up replanting after exhausting all the unfelled areas. By this method, a complete series of regular plantations will be built up at the end of the rotation. There will be 100 acres in each age gradation.

407. It has to be borne in view that apart from the 2,070 acres in Sivagiri series no further suitable area is available. The areas fit for matchwood in this series are marked in the working plan map, and the District Forest Officer will have discretion to locate the planting siite within the marked area. The regeneration area of the year will be contiguous to the regeneration areas of the preceeding year.

SECTION 7—REGULATION OF REGENERATION OPERATIONS.

408. *Clearing and burning.*—After the saleable material had been removed, the remaining growth should be clearfelled completely and left to dry evently scattered over the area. Along with this, all grass bushes also should be uprooted and left to dry. During April, this will be completed in Padarmalai series and during August in Sivagiri series.

409. The slash will then be burnt, and materials left unburnt will be billetted, heaped over the unburnt patches and burnt again. A uniform burn of medium intensity is the ideal, the care should be taken to prevent the fire from escfaping into the neighbouring forests and plantations. This work will be completed before the end of April in Padarmalai series and before middle of August in Sivagiri series.

410. *Lining and Staking.*—The spacing will be 16½ feet by 16½ feet in Padarmalai series and 12 feet by 12 feet in Sivagiri series. Stakes 12 to 15 inches in length will be used. This will be completed by the middle of May in Padarmalai series and by the middle of September in Sivagiri series.

411. *Planting.*—Following a few intermittent premonsoon showers, for the Padarmalai series, the monsoon breaks usually between the 25th of May and early June. Nacked transplants of *Salmalia malabaricum* will be planted out in crow bar holes and container plants of *Ailanthus excelsa* will be planted in one foot cube pits. Planting will be done either at the beginning of the monsoon or on a rainy day of the pre-monsoon showers when the ground is sufficiently moist. Secondly, seeds of *Ailanthus excelsa* ripen in March and the basket seedlings are fit for planting out only in May. For these reasons the planting season for Padarmalai series will be from the 25th of May to the 5th of June.

412. *Salmalia malabar-cum and Ailanthus excelsa* will be planted in alternate diagonal lines in Padarmalai.

413. One year old nursery seedlings of *Salmalia malabaricum* at least 2½ feet tall and one inch thick at the collar will be planted out in crowbar holes when the ground is liberally moist, care should be taken to consolidate the earth around the plant and not to expose the collar reigon above ground levgel. On steep slopes, a smal edge will be formed before planting the seedlings; and after planting, a few stones will be arrangd in an arch on the lower slide of the ledge so as to prevent any erosion anod exposure of the root.

414. The crowbars should have been sharpened in advance, for neglect of this precaution greatly hinders planting.

415. Just as naked seedlings in crowbar holes give the best results for *Salmalia malabaricum*, basket seedlings of two to six months old give the best results for *Ailanthus excelsa*. In Padarmalai series, two months old basket seedlings of *Ailanthus excelsa* will be planted out in pits on alternate diagonal rows during the planting season. In order to give some more time for the basket plants to grow, it will be better first to plant out all the *Salmalia* seedlings and then take up *Ailanthus* seedlings.

416. In Sivagiri series the species to be planted will be *Ailanthus excelsa* alone since the rainfall is not sufficient for *Salmalia malabaricum*. The locality gets most of its rain from the north-east monsoon and planting season will usually be from the 21st of September to 15th of October. Basket seedlings of *Ailanthus excelsa* which will be six months old, will be planted out in pits. A shallow depression of saucer shape and four feet in diameter around each plant will be formed at the time of planting, as a measure to supply more rain water.

417. Planting should be swift, since sluggish planting spread over many days would lose the benefit of time and rains. In Sivagiri where the rainy days are few, success of a plantation much depends on quick planting.

418. Between two adjacent plantations a 20 feet wide strip should be left unplanted so that it would serve as a boundary line and inspection path.

419. *Casualties.*—Two weeks after planting, casualties will be replaced. In Padarmalai series this work should be completed by June and in Sivagiri series before the end of October. Casualties will be replaced during the second year. If there are heavy casualties, replacement of casualties will be done in the third year also.

420. *Kumri.*—No departmental kumri will be undertaken. But the planting area may be given for kumri cultivation of crops like tapioca, sweet potato, chillies, ragi, cotton, etc., Kumri cultivation so effectively keeps down the weeds that, in a place like Sivagiri, where there is difficulty for kumridars, it will be profitable ever to subsidise kumridars.

421. Silvicultural workers like planting, weeding, soil working, etc., will be done by the department.

422. *First year weeding.*—For Padarmalai series, there will be four weedings in the first year. The first weeding in July will be to scrape off all weeds to a diameter of three feet all round the pant. The second weeding in September, third weeding in November and fourth weeding in January will also be done in the same manner. If there is no kumri cultivation, strip weeding will be done to a width of three feet on either side of the planting line. Scraping will be done to a radius of three feet around the plant.

423. For Sivagiri series, there will be two weedings in the first year one in November and the other in January. The first weeding will consist of uprooting all weeds to a diameter of four feet and leaving a shallow depression of saucer shape. The second weeding will be to scrape off all weeds and leave the soil loose in the saucer shaped depression to diameter of 4 feet. If there is no kumri cultivation, strip weeding will be done to a width of 3 feet on either side of the planting line. Scraping will be done to a radius of 3 feet around the plant. The cut materials will be used for mulching after final weeding of the year.

424. At no stage should the kumri crop be allowed to suppress the plants.

425. *Second year weeding.*—For Padarmalai series, there will be three weedings in the second year, to be done in May, July and December. The work will be to scrape off weeds with roots to a diameter of 4 feet all round the plant.

426. For Sivagiri series, there will be four weedings in the second year. The first weeding to be given in July will consist of uprooting all weeds to a diameter of 4 feet and leaving a shallow saucer shaped depression. The second weeding in September, third weeding in November and fourth weeding in January will be to scrape all weeds to a diameter of 4 feet in the shallow depression around the plant. The cut materials will be used for mulching around the plant after final weeding of the year.

427. No weeding need be done to plants that have grown beyond the height of a man. All weedings immediately after completion, will be inspected by the District Forest Officer.

428. *Nursery.*—Nurseries may be formed at convenient places, and will be fenced. The site will be given a good burn and after digging the ground to a depth of 18 inches all stumps and roots will be removed. Standard beds of 40 feet by 4 feet, strengthened by pegs and split bamboos on the sides will be formed. Between the beds a two feet wide path should be left.

429. Seeds of *Salmalia malabaricum* are ripe for collection from the end of March to May. To an ounce there are 855 to 963 seeds and a pound of seeds gives 1,084 plantable seedlings. For the first two years *salmalia* grows rather slow; and thin lanky seedlings resulting from thick sowings in beds take a long time to establish themselves. On the other hand, stout and sturdy seedlings resulting from thin sowings readily establish themselves and begin to grow after transplanting. It is, therefore, necessary that sowings on the beds should be thin. Three ounces of seeds per standard bed will give enough seedlings to plant and replace casualties over two acres in alternate diagonal lines.

430. By the 1st of May, seeds at 3 ounces per bed will be sown and covered with fine soil to a depth equal to the thickness of seed. Over this will be laid a layer of twigs and then a layer of straw. Beds will be watered if there is no rain, and the twigs and straw should be removed when signs of uniform germination become apparent.

431. *Ailanthus excelsa* is to be planted with basket seedlings and the seeds become ripe for collection in March-April. There are about 280 seeds to an ounce. Immediately after collection, seeds at two to three per basket should be sown and covered with a thin layer of soil. Watering should be done with a fine rose can and continued as long as necessary. A pound of seeds will give sufficient seedlings to plant and replace casualties over 8 acres in alternate diagonal lines. As an alternative method, 3 pounds of seeds should be sown on a standard bed immediately after collection, and watered. When the seedlings are about 3 inches tall (three weeks old), they should be pricked out into baskets or polythene bags. These can then be planted out in the field after about three weeks.

432. Grass-hoppers have a tendency to damage the tender seedlings of *Ailanthus excelsa.* Any insecticide will put an end to this trouble.

SECTION 8—SUBSIDIARY SILVICULTURAL REGULATIONS.

433. Any multiple shoots noticed during weedings shall be clipped off leaving the best one. Plants broken by animals or other agents will be cut back neatly at ground level.

434. At the time of weeding, all pupae of the Ailanthus defoliators settled on the main stem will be destroyed by hand.

SECTION 9—OTHER REGULATIONS.

435. Every plantation at salient corners should be indicated by its plantation boards showing the calendar year of its formation and the acreage.

436. The exact area of each plantation should be found out by actual survey of the planted area. A map of each plantation drawn to the scale of 4 inches to a mile will be filed with the control form so that it will be useful at the time of next revision.

437. A plantation journal will be maintained for each plantation, wherein the name of plantation, location, area, nature of previous growth, revenue obtained by clearfelling, details and cost of formation and further history of the plantation will be recorded.

438. *Control.*—The control forms pertaining to this working circle should be posted soon after the close of every financial year. Sample forms will be found in the appendix.

CHAPTER IV.—WORKING PLAN FOR THE FUEL WORKING CIRCLE.

SECTION 1—GENERAL CONSTITUTION OF THE WORKING CIRCLE.

439. The fuel working circle includes all portions of the deciduous forests which are fit for exploitation. The Aladiyur forests, which are subjected to uncontrollable theft have been brought under a new series in order to meet the acute demand for fuel in the region. Incidentally, this will also sustain the toy making industry at Ambasamudram, which at present depends mostly on illicit wood.

440. The total area of the working circle is 22,123 acres.

SECTION 2—DIVISION OF THE AREA.

441. This working circle covers Shencottah, Ambasamudram, Kuttalam and Sankarankoil Ranges. Areas which affect the aesthetic beauty and flow of water in the various falls of Kuttalam have been spread from this working circle. For similar considerations, the small hillock to the west of Papanasam Lower Camp has also been left out. Consequent on the large scale matchwood and teak plantations in Ambasamudram and Sankarankoil ranges, a readjustment of the old series had to be made.

442. The working circle is divided into ten felling series of covenient sizes so that the annual coupes in each series will be of manageable size. The following statement gives details of the felling series :—

Range. (1)	*Felling series.* (2)	*Area of series in acres.* (3)
Ambasamudram	Aladiyur	1,511
Do.	Koraiar	1,585
Do.	Ambur	1,834
Do.	Sivasailam	2,524
Do.	Govindaperi	1,438
Kuttalam	Chinnakadu	2,163
Do.	Kadayanallur	3,006
Do.	Mathalamparai	2,004
Sankarankoil	Vasudevanallur	3,079
Do.	Karuppanasamikoil	2,989

NOTE.—Part of Chinnakadu series falls in Shencottah range.

SECTION 3—ANALYSIS OF THE CROP.

443. This working circle comprises the outer slopes and foot hills, which receive an annual rainfall of about 40 inches. Excessive grazing and frequent fires are outstanding features of the region. Trees generally attain a height of about 30 feet and do not reach great dimensions because for half the year they remain leafless. Due to repeated cutting and the diminishing rainfall, ther has been a general retrogression of the growth. Strangely, this is the most highly paying forest of the division. Natural regeneration is generally poor and even the little that comes up under the north-east monsoon succumbs to the rigors of the following summer.

444. The species constituting the crop has those listed out in paragraph 72.

SECTION 4—METHOD OF TREATMENT.

445. *Silvicultural system.*—To be remunerative, a forest that has to be worked extensively needs to be exploited in the simplest manner. The silvicultural system adopted will therefore, be the " Simple Coppice " system.

446. *Rotation.*—The average mean annual girth increment for the fuel species varies from 0.5 to 0.75 inch. A longer rotation results in bigger stems and greater yield per acre; it also gives the benefit of a long interval between successive fellings. As against this, it reduces the coppicing power of the stumps which is the main source of regeneration, and it naturally brings about a reduction in the annual area to be felled. In view of these considerations, the rotation followed by the previous two working plans was 30 years. Accordingly, the rotation will continue to be 30 years.

447. *Regulation of working.*—The working will be regulated purely on the area basis. No attempt is made to demarcate the coupes on equi-productive basis, since the crop does not lend itself to such differentiation. Each felling series is thus divided into 30 coupes of approximately equal area. In marking the coupes on the map, attempts have been made to have the boundaries of the coupes north to south and east to west and to have the coupes to the shape of a square. For easy laying out in the field, consistent with the nature of growth, the coupes have been marked in a fairly regular order.

448. Almost all the felling series have been readjusted, and to make it easy for the next revision of the working plan, all the 30 coupes in each series have been marked in the map.

SECTION 5—METHOD OF EXECUTING THE FELLING.

449. One coupe in each series will be felled every year and the order in which the coupes are to be worked is indicated in the working plan map.

450. By October, the coupe to be felled in each series will be surveyed and demarcated on the ground by means of six feet wide cut lines, in accordance with the working plan map. At suitable intervals, whitewashed cairns of $1\frac{1}{2}$ feet high will be constructed on the cut lines. Each coupe will be divided into not more than three strips by means of three feet wide cut lines. At the time of survey, trees to be reserved should be serially numbered and an enumeration list of such trees in each strip showing the girth, species and location in the coupe should be prepared.

451. The correct area of a coupe will be computed on the basis of survey. Any difference below 5 per cent between the working plan area and surveyed area will not be treated as diviation requiring sanction.

452. The survey of coupes should be checked by the District Forest Officer or his Gazetted Assistant in accordance with the orders of the Chief Conservator of Forests from time to time. When the contractor vacates a coupe, the reserved trees should be verified with the enumeration list by an officer not less than a Forester in rank.

453. *Agency of felling.*—The coupes will be exploited through the agency of contractors. No departmental working shall be undertaken. The coupes will be sold in public auction some time in January and the lease period will be from 1st April to 31st March, depending on the size of the coupe.

454. *Felling rules.*—(1) Strip by strip the growth shall be felled. The order in which the strips are to be felled will be shown in the sketch accompanying the agreement. Fellings in a new strip may be started only after work in the previous strip is completed and passed as satisfactory by the Range Officer after inspection.

(2) Species like sandal, tamarind, soapnut, pungam, neem and *Terminalia chebula* will be classed as reserved trees and shall not be felled. The Fuel Coupe contractor will have no right over the bamboos occuring in his coupe.

(3) It will be open to the lessee to cut and remove all growth other than the reserved trees. The cut should be clean and close to the ground. Bark on the cut stools should not be separated from the wood. Sharp implements should be used. Useless species like *Balsamodendron berryi*, *Protium*, *Gyrocrapus*, etc., should be felled whether the contractor wants them or not.

(4) Trimming of stools should be done immediately after felling and not at a subsequent date.

(5) Before removal, all timber shall be hammermarked by a Forester.

(6) Prior to removal, the felled firewood shall be billetted and stacked.

(7) Yield figures of timber and fuel from each coupe shall be posted in the yield register and control book without fail.

(8) Growth standing between the banks of a stream shall not be felled. In the case of perennial streams standing growth to a width of one chain on either bank will be excluded from felling.

455. *Coupe arrears.*—If, at the end of the lease period, any portion of a coupe remains unfelled, such portion will be resurveyed and sold in auction. In such cases, the fact should be recorded in the Control Book.

SECTION 6—TABULAR STATEMENT OF FELLINGS.

456. The following statement shows the coupes in each felling series that are to be worked each year :—

		Ambasamudram Range.			
Year of felling.	*Coupe number.*	*Koraiar series.*	*Ambur series.*	*Sivasailam series.*	*Govindaperi series.*
(1)	(2)	(3)	(4)	(5)	(6)
		ACS.	ACS.	ACS.	ACS.
1979–80	I	48·0	55·0	136·0	52·0
1980–81	II	42·0	80·0	76·0	50·0
1981–82	III	51·0	67·0	93·0	61·0
1982–83	IV	45·0	59·0	84·0	51·0
1983–84	V	62·0	66.0	68·0	55·0
1984–85	VI	75·0	71·0	121·0	55·0
1985–86	VII	72·0	74·0	100·0	59·0
1986–87	VIII	75·0	52·0	109·0	40·0
1987–88	IX	65·0	51·0	109·0	38·0
1988–89	X	59·0	58·0	130·0	41·0
1989–90	XI	52·0	50·0	108·0	84.0

		Ambasamudram Range.			
Year of working.	Coupe number.	Koraiar series.	Ambur series.	Sivasailam range.	Govindaperi series.
(1)	(2)	(3)	(4)	(5)	(6)
		ACS.	ACS.	ACS.	ACS.
1990–91	XII	40·0	48·0	72·0	38·0
1961–62	XIII	46·0	44·0	63·0	70·0
1962–63	XIV	49·0	44·0	67·0	46·0
1963–64	XV	48·0	57·0	67·0	44·0
1964–65	XVI	55·0	49·0	55·0	45·0
1965–66	XVII	53·0	61·0	57·0	40·0
1966–67	XVIII	43·0	56·0	64·0	38·0
1967–68	XIX	53·0	69·0	102·0	40·0
1968–69	XX	46·0	61·0	75·0	44·0
1969–70	XXI	55·0	79·0	64·0	37·0
1970–71	XXII	45·0	65·0	65·0	52·0
1971–72	XXIII	50·0	57·0	59·0	47·0
1972–73	XXIV	52·0	61·0	76·0	43·0
1973–74	XXV	62·0	71·0	75·0	65·0
1974–75	XXVI	51·0	67·0	56·0	59·0
1975–76	XXVII	59·0	75·0	96·0	40·0
1976–77	XXVIII	54·0	63·0	87·0	52·0
1977–78	XXIX	42·0	41·0	90·0	38·0
1978–79	XXX	36·0	83·0	105·0	50·0

Year of working.	Aladiyur series coupe number.	Area in acres.	Year of working.	Aladiyur series coupe number.	Area in acres.
(1)	(2)	(3)	(4)	(5)	(6)
1961–62	I	50	1965–66	V	52
1962–63	II	52	1966–67	VI	53
1963–64	III	52	1967–68	VII	50
1964–65	IV	46	1968–69	VIII	52
1969–70	IX	48	1970–71	X	52
1971–72	XI	51	1972–73	XII	51
1973–74	XIII	52	1974–75	XIV	51
1975–76	XV	56	1976–77	XVI	54
1977–78	XVII	56	1978–79	XVIII	50
1979–80	XIX	53	1980–81	XX	51
1981–82	XXI	48	1982–83	XXII	50
1983–84	XXIII	48	1984–85	XXIV	49
1985–86	XXV	49	1986–87	XXVI	50
1987–88	XXVII	47	1988–89	XXVIII	49
1989–90	XXIX	46	1990–91	XXX	43

NOTE.—Aladiyur series has been newly constituted in Ambasamudram Range

		Kuttalam Range.		Sankarankoil Range.		
Year of working.	Coupe number.	Chinnakadu series.	Kadayanallur series.	Mathalamparai series.	Vasudevanallur series.	Karuppannasamikoil series.
(1)	(2)	(3)	(4)	(5)	(6)	(7)
		ACRES.	ACRES.	ACRES.	ACRES.	ACRES.
1979–80	I	67·00	92·00	40·00	84·00	106·00
1980–81	II	66.00	93·00	81·00	84·00	118·00
1981–82	III	66·00	92·00	62·00	84·00	88·00
1982–83	IV	66·00	93·00	68·00	120 00	84·00
1983–84	V	68·00	99·00	66·00	120·00	45·00
1984–85	VI	68·00	98·00	59·00	106·00	138·00
1985–86	VII	66·00	100·00	68·00	103·00	100·00
1986–87	VIII	72·00	100·00	69·00	117·00	124.00
1987–88	IX	83·00	102·00	54·00	129·00	112·00
1988–89	X	82·00	101·00	65·00	135·00	130·00
1989–90	XI	75·00	101·00	62·00	155·00	113·00
1990–91	XII	74·00	103·00	66·00	133·00	128·00
1961–62	XIII	90·00	101·00	58·00	88·00	143·00
1962–63	XIV	74·00	103·00	64·00	88·00	133·00
1963–64	XV	72·00	102·00	109·00	93·00	97·00
1964–65	XVI	72 00	102·00	77·00	89·00	102·00
1965–66	XVII	75·00	100·00	102·00	92·00	119·00
1966–67	XVIII	72·00	102·00	73 00	120·00	99·00
1967–68	XIX	72·00	103·00	75·00	115·00	98·00
1968–69	XX	72·00	101·00	72·00	97·00	87·00
1969–70	XXI	72.00	103·00	69·00	97·00	100·00
1970–71	XXII	73·00	102·00	88·00	114·00	93·00
1971–72	XXIII	74·00	103·00	61·00	78·00	91·00
1972–73	XXIV	72·00	102·00	58·00	101·00	103 00
1973–74	XXV	72·00	101·00	56·00	101·00	65·00
1974–75	XXVI	73·00	102·00	54·00	101·00	66·00
1975–76	XXVII	68·00	100·00	66·00	85·00	51·00
1976–77	XXVIII	67·00	100·00	56·00	83·00	62·00
1977–78	XXIX	70·00	102·00	48·00	83·00	80·00
1978–79	XXX	70·00	102·00	58·00	84·00	105·00

NOTE.—1 Coupes I to XII were recently worked.

2 Coupes VIII to X and XIV to XVII of Chinnakadu series fall in Shencottah Range limits.

SECTION 7—OTHER REGULATIONS.

457. In Ambur series, the coppice regeneration will be supplemented by taking up concentrated artificial regeneration. Such of the areas of the coupe which lend itself for artificial regeneration will be taken up during the year of working of the coupe and seedlings planted at an espacement of 16½ feet by 16½ feet. Species used for planting will include Neem, Vagai, Usil, *Eucalyptus hybrid* or *Cameldulences*. In the year subsequent to felling all couppice shoots will be tended. Natural seedlings of a valuable species will also be tended. The number of coppice shoots should be thinned to six.

Demarcation.—Before fellings are completed, the coupe shall be demarcated with stone slabs at four salient corners. The stone slabs should show the number of the coupe and the year of working along with the number of the adjoining coupe and its year of working. Obsolete stones will be pulled down.

458. *Statistics.*—Every contractor shall be required to furnish monthly statements of removals of firewood and timber from the coupes, not later than the 15th of the following months. These statements should show the quantity of firewood removed in tons or stacked volume and the quantity of firewood removed in head load tickets. For timber, the species and volume in cubic feet under each species should be furnished, the total removals of firewood and timber during the year will be posted in the appropriate columns in the control book.

459. *Maps.*—After fellings are completed in a coupe, a surveyed map of the coupe will be marked in the control map, with the year of working written in black ink at the centre of the coupe. Wherever the coupe leased out differs from that prescribed, the actual area should be marked in dotted black lines, where coupes arrears are worked subsequently, it will suffice to show the year of working in the arrear area.

460. *Control.*—A record of yield and a control of fellings shall be posted Annually. Sample forms are given in Appendix.

CHAPTER V—WORKING PLAN FOR THE TIMBER-*CUM*-FUEL WORKING CIRCLE.

SECTION 1—GENERAL CONSTITUTION OF THE WORKING CIRCLE.

461. The timber-*cum*-fuel working circle includes the better portions of the deciduous forests, where the soil and rainfall conditions promote a more impressive growth. This in turn produces small timber and a much higher yield of fuel. At one time these forests were worked under 'Coppice with standards' system which had to be given up for various reasons. These forests are generally situated in valleys where the rainfall is higher than what it is in the surrounding locality. Consequently the area is drained by perennial or almost perennial streams and rivers.

462. The total area of the working circle is 11,192 acres.

SECTION 2—DIVISION OF THE AREA.

463. Portions of Ambasamudram and Sankarankoil ranges come under this working circle. Since the former Padarmalai series has been brought under the Matchwood working circle, there has been a readjustment of this working circle in Ambasamudram range. As regards Sankarankoil range, a new series has come into existence. Altogether there are three series in this working circle.

464. The following statement gives details of the felling series :—

Range. (1)	*Name of series.* (2)	*Area in acres of series.* (3)
Ambasamudram	Koilteri	2,186
Sankarankoil	Kombaiar	6,124
Do.	Puliangudi	2,882

465. Out of 11,192 acres in the working circle, an area of 2,186 acres falls in Ambasamudram range and the remaining 9,006 acres fall in Sankarankoil range.

SECTION 3—ANALYSIS OF THE CROP.

466. Sheltered regions of the foot hills receiving an annual rainfall of about 45 inches generally come under this working circle. The soil is less shallow and less hard when compared to the fuel forests. In other words, conditions resemble those of the moist deciduous forests rather than those of the dry deciduous fuel forests. Trees, generally, attain a height of 40 feet and girth of 2 to 3 feet and remain in leaves for more than half the year. Fires are comparatively rare, though the forests are well used for grazing. There is a fair amount of natural regeneration and their chances of surviving the following summer are generlly good. Unfortunately, this type of forest badly suffers from illicit fellings.

467. There is a good proportion of coppiced teak in the crop. The species found are those listed out in paragraph 72. But the incidence of *Pterocarpus marsupium, Stereospermum chelonoides, Grewia tilaefolia, Albizzia lebbeck, Streblus asper*, rosewood, etc., is greater than what it is in the ordinary fuel forests.

SECTION 4—METHOD OF TREATMENT.

468. *Silvicultural system.*—Exploitation and regeneration will be under the system of ' Simple coppice '.

469. *Rotation.*—The object of this working circle is to grow small timber for local requirements, taking advantage of the favourable factors prevailing in the locality. The average mean annual increment of the species is better than that of the species in an ordinary fuel forest for the simple reason that all conditions are move favourable in this working circle. However, one aspect that has to be reckoned with is that, with increasing age, the coppicing power of the stumps declines. And for the deciduous species this dicline starts between 30 to 40 years. Considering the better soil and rainfall conditions, it will therefore, be reasonable to adopt the higher limit. Accordingly the rotation is fixed at 40 years. Incidentally, this was the rotation followed hitherto.

470. *Regulation of working.*—Exploitation will be regulated by simple area; consequently, no attempt is made to mark out the coupes on equi-productive basis. Each felling series is divided into 40 coupes. In Kombaiar series, coupes near the reserve boundary had been permanently demarcated in the field by the zamindar, with clear lines devoid of any trees or stumps. It will be immensely advantageous to preserve these demarcations, and for that reason those boundaries have been retained for coupes, to be worked under this plan also. For the other coupes, attempts have been made to have the boundaries north to south and east to west. Consistent with stocking, the coupes have been marked in a fairly regular order.

471. To make it easy for the next revision of the plan, all the 40 coupe in each series have been marked in the working plan map.

472. *Thinning in teak coppice.*—Reduction of coppice shoots of teak will be done in the year after felling. The number of shoots will be reduced to three per stool. In the case of other valuable species, multiple coppice shoots will be reduced to six per stool. Another tending will be done in the seventh year, when all climbers on valuable species will be cut. In the case of teak the number of coppice shoots will be reduced to two per stool in the seventh year.

SECTION 5—METHOD OF EXECUTING THE FELLINGS.

473. The prescriptions laid down for the Fuel Working Circle will be followed here.

474. Each coupe in the series will form a separate lease unit.

SECTION 6—TABULAR STATEMENT OF FELLINGS.

475. The order in which the coupes are to be felled is given in the following table :—

Year of working.	Coupe number.	Ambasamudram range.	Sankarankoil range.	
		Koilteri series.	Kombaiar series.	Puliangudi series.
(1)	(2)	(3)	(4)	(5)
		ACRES.	ACRES.	ACRES.
1989–90	I	58·0	121·0	95·0
1990–91	II	58·0	129·0	62·0
1991–92	III	55·0	169·0	91·0
1992–93	IV	54·0	170·0	88·0
1993–94	V	55·0	132·0	62·0
1994–95	VI	56·0	187·0	50·0
1995–96	VII	56·0	162·0	94·0
1996–97	VIII	56·0	150·0	56·0
1997–98	IX	56·0	148.0	72·0
1998–99	X	56·0	195·0	56·0
1999–2000	XI	57·0	161·0	72·0
2000–01	XII	56·0	162·0	66·0
1961–62	XIII	55·0	203·0	80·0
1962–63	XIV	55·0	184·0	57·0
1963–64	XV	56·0	171·0	54·0
1964–65	XVI	54·0	120·0	38·0
1965–66	XVII	58·0	166·0	78·0
1966–67	XVIII	56·0	150·0	88·0
1967–68	XIX	54·0	201·0	76·0
1968–69	XX	55·0	164·0	78·0
1969–70	XXI	55·0	174·0	81·0
1970–71	XXII	56·0	157·0	62·0
1971–72	XXIII	54·0	195·0	82·0
1972–73	XXIV	53·0	147·0	70·0

Year of working.	Coups number.	Ambasamudram range.	Sankarankoil range.	
		Koilteri series.	Kombaiar series.	Puliangudi series.
(1)	(2)	(3)	(4)	(5)
		ACRES.	ACRES.	ACRES.
1973–74	XXV	53·0	134·0	101·0
1974–75	XXVI	53·0	104·0	78·0
1975–76	XXVII	49·0	118 0	82·0
1976–77	XXVIII	47·0	112·0	62·0
1977–78	XXIX	50·0	129·0	66·0
1978–79	XXX	54·0	127·0	63·0
1979–80	XXXI	53·0	161·0	74·0
1980–81	XXXII	54 0	165·0	53·0
1981–82	XXXIII	53·0	131·0	69·0
1982–83	XXXIV	53·0	120·0	68·0
1983–84	XXXV	54·0	130·0	60·0
1984–85	XXXVI	54·0	190·0	59·0
1985–86	XXXVII	56·0	175·0	56·0
1986–87	XXXVIII	56·0	93·0	65·0
1987–88	XXXIX	57·0	134·0	78·0
1988–89	XL	56·0	177 0	80·0

NOTE.—Coupes I to XII were recently felled.

SECTION 7—OTHER REGULATIONS.

476. The prescriptions given for the Fuel Working Circle will be followed for this working circle.

CHAPTER VI—WORKING PLAN FOR THE AFFORESTATION WORKING CIRCLE.

SECTION 1—GENERAL CONSTITUTION OF THE WORKING CIRCLE.

477. It has long been realised that repeated cutting brings down the coppicing power of fuel species, which, in the absence of natural regeneration to any appreciable degree, results in the retrogression. To overcome this, small scale regeneration works were undertaken in fuel coupes, but this was abandoned as the results were disappointing. Again, when the estate and panchayat forests were taken over by the department, the denuded condition of these fuel forests gave an impetus to revive the afforestation works in 1953 under the First Five-Year Plan and continue the work under successive Five-Year Plans. This afforestation of dry fuel forests has now become a work under the Five-Year Plan with techniques laid out from time to time. The object of this working circle is to leave a set of standing prescriptions for purpose of continued technique and planting programme. However, the techniques and areas prescribed in this working plan for afforestation works will hold good for the Five-Year Plan works also.

478. The total area of the working circle is 2,401·66 acres of which an area of 1,221.66 acres represents the extent taken up for afforestation since 1953 and the remaining 1,180 acres represent the area selected for afforestation under the working plan. This working circle covers Kuttalam range.

SECTION 2—DIVISION OF THE AREA.

479. Afforestation of dry fuel forests was confined to Kuttalam range in Uthumalai ex-Zamin forest and Sivalarkulam and Mayamankurichi ex-panchayat forests. These forests lie scattered in the plains far away from the main western ghats. The annual area taken up for afforestation had varied widely.

480. The following statement shows the areas taken up for afforestation up to 1959 :—

Locality.	Year of Planting.	Area in Acres.
(1)	(2)	(3)
Uthumalai	1953	137·36
	1955	62·70
	1956	5·00
	1958	142·00
	1959	270·00
Sivalarkulam	1956	75·00
	1957	160·00
	1959	75·00
Mayamankurichi	1954	154·00
	1955	75·00
	1956	65·00

481. All suitable areas for afforestation works in the ex-panchayat and ex-zamin forests have been exhausted. In future, afforestation works will, therefore, be taken up on the western slopes of Uthumalai forest which is the only suitable bit of forest. Out of a total area of 3,472·80 acres of Uthumalai forest, 617·06 acres were afforsted (though not successfully) and still 1,180 acres are available for afforestation. This

portion is marked in the working plan map. The entire working circle area, if successfully afforested, can form a convenient series to be known as the Uthumalai Afforestation Series. It is proposed to take annually 100 acres for afforestation. For works under the five year plan, after exhausting the suitable area in Uthumalai forest, new sites can be taken Mathalamparai fuel series. The coupe felled in previous year will be afforested in the following year. Since the area is hilly, the appropriate technique should be adopted.

482. Areas taken up for afforestation works are shown in the working plan map. Afforested areas in Uthumalai forest cannot be said to be a success; these will, therefore, be afforested again towards the latter half of the plan period.

SECTION 3—ANALYSIS OF THE CROP.

483. Afforested areas were in the plains, detached from the ghats. The localities get an annual rainfall of 20 to 30 inches, eratically poured down exclusively by the north-east monsoon, expect for an occasional drizzle by the south-west monsoon. The low rainfall in itself is a serious handicap, but this is made worse by the rain pouring out every thing in a few rainy days and resulting in a quick run off without giving a chance for the water to percolate through the hard soil. This is then followed by a dry period of nine months. On the part of the soil, it is hardened by trampling of cattle and the top soil is already washed away leaving stones and pebbles as can be seen in Sivalarkulam and Mayamankurichi forests. Even to wound the soil one has to use a pick-axe and it is a wonder how the tender roots of plants are able to find their way in.

484. The existing growth is a Carnatic Umbrella Thorn Forest type described in chapter II of Part I. The species constituting the crop are those mentioned in paragraph 78. Sivalarkulam and Mayamankurichi forests resemble each other in containing a predominant stand of *Balasmodendron berryii, Acacia latronum* and *Acacia planifrons*. In Uthumalai forest, the single predominant species is *Erythroxylon monogynum* admixed with *Gyrocarpus americana, Mundulea suberosa* and *Dodonea viscosa*; but the soil is a red soft loam over a greater part of the forest. The general height of the vegetation is only 10 to 12 feet and the proportion of useful species is very low. Species like neem and vagai are almost absent.

485. The species used in afforestation works of the past were, Neem, Tamarind, Vagai, *Acacia planifrons, Prosopis juliflora, Pongamia glabra*, etc. In general, plants that had the benefit of trenches have shown better growth and survival per cent. But wherever the soil conditions are unsuitable, as in Mayamankurichi and Sivalarkulam forests, plants stagnate and do not grow beyond one foot even after five years. Comparatively, the best growth found in the afforestation plots of Uthumalai can be attributed to the better soil conditions. However, the stocking in all the plots is only 10 to 20 per cent, inspite of the best efforts put in. The cause for such severe casualties is climate. It will be desirable to afforest again the failed plantations in Uthumalai forest till we get full stocking.

SECTION 4—METHOD OF TREATMENT.

486. The standing growth is already poor both in quality and quantity does not lend itself to any kind of exploitation. This entails regeneration works without preparatory works like clear feeling and burning. The treatment given will therefore be to retain the existing growth as it is and to plant out seedling of valuable species at regular intervals in the midst of cleared strip lines, supplemented by water conserving methods. The system will therefore, be one of concentrated artificial regeneration without feeling the existing growth.

487. *Rotation*—As already stated, the treatment does not contemplate any exploitation of the growth while afforesting the site. The object is to improve and supplement the existing stock in the shortest possible time by the best known methods so that in course of time the forest will have improved and become more useful as a fuel forest. But the extent to be taken up annually will depend on the five year plan targets and the planted area will not become mature for exploitation at the end of this plan. The question of rotation will, therefore be decided at the next revision.

488. *Choice of species.*—In selecting species for this delicate work, the requirements of individual species should be kept in view. Each species has its own requirements and it is important that this should be borne in mind while planting out. The dry fuel forest species have already the handicap of the low rainfall and poor nutrients in the soil, and are very sensitive to the texture of soil. This makes in imperative to devote greater attention to the selection of species for edaphic variation. Species best suited for the various kinds of soil are given below :—

1. *Albizzia amara*—for stony soils mixed with quartizite.
2. *Acacia lecopholea*—for read soils mixed with kankar.

3. *Acacia planifrons*—for stony soils without quartzite.
4. *Albizzia lebbeck*—for poor hard soil.
5. *Azardirachta indica*—for soft soils.

489. *Espacement.*—Planting will be done at an espacement of 12 feet by 12 feet.

SECTION 5—REGULATION OF REGENERATION OPERATIONS.

490. *Preparatory works.*—The area to be afforested will be surveyed and demarcated on the ground with six feet wide cleared lines and rough stones cairns at frequent intervals. In the regeneration area, four feet wide, strip lines will be cleared at intervals of 12 feet from centre to centre. If saplings and poles of the useful species happen to stand on the strip lines, they will not be cut down. On sloping ground the strips should run at right angles to the slope.

491. Annually an area of 100 acres will be taken up in Uthumalai forest on the western slope, shown in the working plan map.

492. On level countries, pits with saucers will be adopted as water conservation method. Pitting should be completed by the end of August. Plants will be planted in the centre of the saucer shaped depression which will collect water and feed to the plant. The earth scooped up for the forming of saucer depression will be heaped on the lower side in the form of a crescent.

493. On slopes one foot deep trenches 6 feet long will be dug. Planting will be done near the centre of the trench in a pit one foot cube dug fowards the down hill side.

494. All the above preliminary works should be completed before the end of September so as to enable planting in October.

495. *Planting.*—The monsoon breaks out at any time between the first week and third week of October and continues intermittently up to December. One year old seedlings raised in pots or baskets or polythene bags should be planted out at the beginning of the monsoon. The planting season will be from 5th to 20th October. Planting should be completed in a few days, for the number of rainy days may not be more than 20 for a year.

496. At the time of planting, seeds of Odai and Tamarind should be sown on the mounds at five to six seeds per mound, where trench method is adopted on the slopes.

497. *Replacement of casualties.*—Casualties should be replaced two weeks after planting and thereafter as and when noticed. Plants put in at the end of the monsoon do not establish themselves.

498. In the second year, as soon as the monsoon breaks out, casualties, will be replaced with one year old seedlings. Along with this trenches that might have got silted up should be cleared.

499. *Weeding and Soil Working.*—Generally there is no problem of weeds for seedlings planted on mounds near trenches. However, plants in the centre of saucer shaped depressions have some competitions from weeds and root suckers and consequently have to be weeded.

500. In the first year one soil working will be done in December at the end of the monsoon. This will consist of scraping the soil and leaving it loose to a depth of only half an inch over the entire saucer shaped depression. This has the effect of retaining the moisture in ground for a longer time. All competing growth will be cut down while doing the soil working. After final soil working, mulching will be done around the collar of the plant to a radius of not less than two feet.

501. In the second year, there will be two soil working to be done in the months of July and December. The nature of soil working will be the same as in the first year. After soil working, mulching will be done around the collar of the plant to a radius of not less than two feet.

502. *Nursery.*—Required seeds should be collected locally in the time without depending on outside agencies. Seedlings should be about a year old at the time of planting, and accordingly the nursery should be raised by November of the previous year. Seeds will be sown on beds of standard size, covered with soil to depth equal to the thickness of seed and watered. When the seedlings are three inches tall they will be pricked out into any kind of container most suitable and practicable for local conditions. Polythene bags, or pots or baskets may be used and seedlings should be watered according to requirements. It will be better to raise the nursery at some place close to the planting site if water is available, so as to avoid damage to seedlings over long distances for transport.

SECTION 6—OTHER REGULATIONS.

503. Near the entrance, every plantation should be indicated by a plantation board showing the calendar year of its formation and the acreage. A map of each panchayat drawn t. the scale of 4 inches to one mile should be filed in the control forms so that it becomes useful at the time of next revision.

504. A plantation journal will be maintained for each year's afforestation plot wherein the location, area, nature of growth, details and cost of planting and further history of the plantation will be recorded.

505. *Control.*—The control from relating to the working circle should be posted at the end of every year.

CHAPTER VII—WORKING PLAN FOR THE SANDALWOOD WORKING CIRCLE.

SECTION 1—GENERAL CONSTITUTION OF THE WORKING CIRCLE.

506. Sandal in the division is confined chiefly to the moist regions of the dry deciduous forests. Most of the sandal grows on the northern slopes of Kuttalam reserve to the south, south-west and south-east of Kuttalam town. However, scattered patches by artificial regeneration have been raised in Padarmalai, Mundanthorai, Aradiyar and Sorimuthayankoil of Ambasamudram range, since 1920. The sandal found in the division is not indigenous as can be seen from the very young crop it is. No one knows when exactly it was introduced into Kuttalam reserve; but the earliest introduction of sandal was some time in 1875 around the Kuttalam temple from when place it has spread to the adjoining forest.

507. Wherever sandal was artificially introduced it was established itself well at the rate of about 50 trees per acre. Natural regeneration is not very high and the number of younger plants and seedlings come across within the sandal areas is generally very small. Nonetheless in some places it seems to have been spreading slowly but steadily. The principal agents for the dispersal of sandal seeds in this division are the Koel and the red vented bulbul. Fruits ripen in March.

508. One interesting feature of the sandal in these forests is that spike disease has not made itself manifest so far, though in Vallioor reserve of Tirunelveli south division it has been recorded. Probably here too we may get it one day.

509. Sandal in Ambasamudram range is two young a crop to yield any scented wood. But the sandal crop in Kuttalam reserve has been under exploitation for nearly 40 years. Accordingly, the sandalwood working circle has been constituted with the sandal tract of Kuttalam range.

510. The total area of the working circle is 1,045 acres.

511. *Felling series.*—There will be one felling series for the working circle and it will be known as the Kuttalam Sandalwood Felling Series. The limits of coupes within the series have been marked in the working plan map.

SECTION 2—METHOD OF TREATMENT.

512. Only dead trees over three inches in girth at breast height will be extracted. In addition, all fallen pieces also will be extracted. No green tree will be extracted.

513. Sandal grows well in these forests and the price of sandalwood is so high that it is the most highly paying forest crop. In view of these considerations, provision is made for artificial regeneration as a regular feature.

514. *Felling cycle.*—In view of the low incidence of the species, theft of sandalwood is unknown in the division. The annual yield itself is very little. Consequently, the danger to which the dead trees and pieces are exposed is only fire. Secondly, sandal trees are the worst infested with climbers wherever they may grow. Not infrequently the crown is strangled by heavy mass of climbers which kill the tree in course of time. This calls for frequent tending of the crop. In view of these considerations a felling cycle of three years is fixed.

515. *Division into coupes.*—The series is divided into three coupes to be worked at the rate of one coupe a year. In fixing the boundaries of coupes, natural features have been followed wherever possible.

516. *Yield.*—Yield will be regulated by area. However, it has to be remembered that the outturn of sandalwood depends on the death of sandal trees due to natural cause and no accruate forecast of yield can be made. But judging from the past, an

annual yield of about a ton can be expected from the division. This low yield can be attributed to the small sizes to which only sandal trees in this division grow and probably to higher per cent of sandalwood.

SECTION 3—METHOD OF EXECUTING THE FELLINGS.

517. Extraction of sandalwood will be by the department. Marking, uprooting, rough-cleaning and accounting will be done departmentally in accordance with the Sandalwood Extraction Rules printed and published by the Government of Madras. No living tree whether diseased or moribund may be extracted. Marking will be continued to dead trees three inches and over in girth at breast height. Along with this, all fallen pieces 3 inches and over in girth at the thick end should be collected.

518. All sandal trees extracted in the division will be final-cleaned in the division and despatched to the Tirupattur sandalwood depot of Vellore West Division. This should be done before the end of September every year so that it would enable the depot range officer to send the final cleaned wood to Tirupattur for sale. Since the annual outturn will be very small, it will be advisible not to open any forest depot but to bring the daily collections to Kuttlam or to the Range Office.

519. Extraction will be confined to one coupe a year. The order in which the coupes have to be worked is given under the statement of fellings and marked in the working plan map.

SECTION 4—TABULAR STATEMENT OF FELLINGS.

520. The following statement shows the year in which each coupe has to be worked :—

Year. (1)	*Number of coupes.* (2)	*Area in acres.* (3)	*Boundaries.* (4)
1961–62 1964–65 1967–68 1970–71 1973–74	I	321	*North*—From the point where Chittar river cuts the Kuttalam reserve boundary line near cairn No. 107 and then along the reserve line up to cairn No. 85; *east*—Reserve line from cairn No. 85 to 81; *south*—A straight line 84 chains long running westwards from cairn No. 81 up to Shenbagadevi temple and *west*—Right bank of Chittar river from Shenbagadevi temple to the point where it comes out of the reserve at cairn No. 107.
1962–63 1965–66 1968–69 1971–72 1974–75	II	254	*North*—Kuttalam reserve boundary from cairn No. 120 up to cairn No. 110 where Chittar river comes out of the reserve; *east*—Left bank of Chittar river from cairn No. 110 up to Shenbagadevi temple and *south*—A straight line of 60 chains long running westwards from Shenbagadevi temple up to a point which is 7 chains due south of cairn No. 130.
1963–64 1966–67 1969–70 1972–73 1975–76	III	470	*North*—Kuttalam reserve boundary from cairn No. 165 up to cairn No. 130; *east*—A straight line 7 chains long running due south from cairn No. 130; *south*—A straight line from a point which is 7 chains south of cairn No. 130 up to the south-western tip of Udetham estate on five falls river and *west*—A straight line from the south western tip of Udetham estate on five falls river up to cairn No. 165.

SECTION 5—SUBSIDIARY SILVICULTURE REGULATIONS.

521. *Tending.*—In the seedlings stage sandal requires shade and protection from browsing animals. As a sapling, it requires lateral shade and a free top to promote height growth. Being a root parasite, it always requires its hosts at close proximity. Thus it will be seen that the tending of sandal involves much skill and variation in treatment according to the kind of plant tended. Any tending operation will aim at freeing the crown from over-topping foliage of other species and at the same time retaining the host plants. As already mentioned, sandal trees are often a favourite with climbers, and the destriction of these climbers is an important part of the tending operation.

522. The sandal trees in each coupe will be tended at the time of marking for extraction. That means, a coupe to be worked will first be tended. The tending will consist of cutting climbers on all sandal trees and the cutting of branches of other species interfering with sandal trees of 4 feet and above in height. Care should, however be taken not to cut and remove completely any tree or shrub which may serve as host. In order therefore to free the heads of sandal and to remove suppression, the interfering branches of other species should be lopped.

523. *Sandal propagation.*—The growing stock of sandal in the division is very small and unless the natural regeneration is supplemented by artificial means the position is not likely to improve.

524. A convenient and inexpensive method is to dibble sandal seeds in the midst of sheltering bushes where conditions for it growth are suitable. The one disadvantage found in this method is that it was difficult to control, and the results were not very encouraging due to low plant per cent. To overcome these two difficulties, we should confine our regeneration works to smaller areas and repeat the sowings over the same site at regular intervals.

525. Accordingly, an area of 20 acres, opposite to the Mundanthorai bungalow, has been marked in the working plan map for sandal propagation. This will be demarcated all around by a cleared line of 8 feet wide and rough stone cairns of 4 feet height at frequent intervals. The demarcated area in turn will be divided into 4 equal strips of five acres each with lines of 8 feet wide and roughstone cairns of 4 feet height. Every year one strip will be taken up for regeneration, and in the fifth year the same first strip and in the sixth year the second strip will be taken up again for regeneration. With a low plant per cent, sandal dibbling do not give a full stocking in one attempt. Repeated sowings year after year only result in satisfactory density of sandal. It is, therefore, hoped that by repeating the process every four years we will be able to get a good sandal stock in about 12 years. Incidentally, it will be easy to assess the results and control the work.

526. By this method, sandal seeds are sown in the month of June in the midst of bushes or near slapings of other species within a strip. The soil should first be worked up to a depth of six inches with a pointed stick or billhook. Five to ten sandal seeds should be sown to a depth of half an inch. Dibbling will be done in patches at an espacement of 6 feet by 6 feet. Each patch shall be indicated by a stick. A strip given this treatment will again be taken up in the fifth year and so on.

527. In order to ensure that the work is done thoroughly, the dibbling shall be done in the immediate presence of the District Forest Officer.

528. *Seed collection.*—Seeds ripen in the month of March. There are several trees on the Mundanthorai plateau from which seeds can easily be connected. Immediately after collection, the pulp from fruits should be removed and then the seeds should be stored in gunny bags after drying. Only seeds of the current year should be used for sowing. At least 5 pounds of seeds will be collected every year.

SECTION 6—OTHER REGULATIONS.

529. The boundary line and strip lines of the propagation centre will be cleared annually in the month of May. Evtry strip should be indicated by a stone slab displaying the strip number alone.

530. A journal will be maintained for the propagation centre as a whole, wherein the details of sowing, cost of observations relating to each strip will be maintained separately. A map of the propagation centre showing the four strips and numbers shall be filed in the journal.

531. *Control.*—The control forms relating to this working circle should be posted at the end of each year.

CHAPTER VIII.—WORKING PLAN FOR THE BAMBOO WORKING CIRCLE.

SECTION 1—GENERAL CONSTITUTION OF THE WORKING CIRCLE.

532. The Bamboo Working Circle includes all areas in the division where bamboo occurs in workable quantities. Shencottah range and Kuttalam range are covered by this working circle. Portion of Puliyara reserve that lies to the south of Achenkoil road and part of Kuttalam reserve that lies to the west of Chittar river constitute this working circle.

533. The gross area of the working circle is 14,630 acres of which the effective area under bamboo is 2,040 acres. The working circle will form one series to be called the Shencottah bamboo series. Since most of the working circle lies in Shencottah range limits, matters relating to sale and lease of all the bamboo coupes will be dealt with by Shencottah Range.

SECTION 2—ANALYSIS OF THE CROP.

534. The bamboo working circle covers the moist deciduous forests which receive an annual rainfall of about 60 inches from both the monsoons. The bamboo growth is formed by *Bambusa arundinacea* alone. In general, growth in Puliyara reserve is much better in quality and quantity due to the higher rainfall.

535. The bamboo areas have been stock mapped and shown in three densities. areas with 20 and more clumps per acre have been shown as *Dense*, those with 10 to 19 clumps per acre as *Sparse* and areas with less than ten clumps per acre are indicated as *Scattering*. The average height of a clum (?) is about 25 feet and on the average a clump contains about 35 culms.

536. Cutting culms at a height of 10 to 15 feet from ground level has left a dense mass of thorns and dead stumps. This has left every clump in a congested condition. To overcome this defect it is necessary that the felling rules are enforced with greater rigor.

SECTION 3—METHOD OF TREATMENT.

537. *System of management.*—The system adopted for working the bamboos will be a selection felling of the culms in the bamboo clumps.

538. *Felling cycle.*—A felling cycle of 3 years has been found to be the most suitable and that is adopted for the working circle. Consequently, the working circle, which consists of one series, is divided into three coupes so that one coupe a year will be exploited by rotation.

539. *Regulation of yield.*—The yield will be regulated by area. Considering the density classes of the bamboo growth, the coupes have been carved out to be equiproductive as far as possible. Consistent with this principle, natural boundaries like roads and rivers have been adopted as the coupe limits.

SECTION 4—METHOD OF EXECUTING THE FEELINGS.

540. One coupe will be exploited every year in the order shown in the tabular statement of fellings. If a coupe remains unsold in a year, it shall not be sold as arrear coupe in the following year. It may be sold again only when its due turn comes according to the felling cycle. The period of lease will be from 1st April to 31st March and the coupe will be put up for sale along with the fuel coupes of the division.

541. The following rules are prescribed :—

(i) No culms less than one year old may be felled.

(ii) Of culms over one year old, at least six culms in a clump shall be left unfelled. This will be in addition to the culms of less thn one year old left unfelled.

(iii) As far as possible, the unfelled culms should be left standing evenly distributed in the clump.

(iv) No culm should be removed with the rhizome.

(v) All cuttings should be above the foot from ground level but below a height of 3 feet.

(vi) No bamboo may be cut and left in the clump.

542. The contractors of the clearfelling coupes of the year will have no right over the bamboos in any of the clear felling coupes.

543. *Agency of felling.*—The bamboo coupes will be worked through the agency of contractors, after a public sale. Departmental exploitation of coupes shall not be undertaken.

SECTION 5—TABULAR STATEMENT OF FELLINGS.

544. Details of coupe to be worked in each year its area and boundary description are given in the following statement :—

Year of working.	*Number of coupe.*	*Gross area in acres.*	*Effective area in acres.*	*Boundaries.*
(1)	(2)	(3)	(4)	(5)
1960-61 1963-64 1966-67 1969-70 1972-73	I	8,807	550	*North.*—The northern boundary of Puliyara reserve from the stream near Neeliammankoil and the northern boundary of Kuttalam reserve up to Chittar river *east.*—The main Chittar river up to Kerala State border. *south.*—The southern boundary of Kuttalam reserve and Puliyara reserve on the Kerala State boundary; and *west.*—The western boundary of Pulivara reserve up to △ 2650 and thence along the Neeliamman koil odai and the along the western boundary of S. Nos. 141 and 143 of Karkudi village.

Year of working. (1)	*Number of coupe.* (2)	*Gross area in acres.* (3)	*Effective area in acres.* (4)	*Boundaries.* (5)
1961–62 1964–65 1967–68 1970–71 1973–74	II	1,130	590	*North.*—The northern boundary of Puliyara reserve from the Shencottah—Quilon road up to Neeliammenkoil Odai. *east.*—Western boundary of S. No. 141 and 143 of Karkudi village and the Neeliammankoil Odai up to △ 2650 on the Kerala State boundary. *south.*—The Southern boundary of Puliyara reserve from △ 2650; and *West.*—Western boundary of Puliyara reserve up to Quilon-Shencottah road and the road itself.
1962–63 1965–66 1968–69 1971–72 1974–75	III	4,693	900	*North.*—Achenkoil-3 Mekara road, *east and south.*—The eastern and southern boundary of Puliyara reserve continued along Quilon-Shencottah road; and *west.*—Madras-Kerala State boundary.

Note.—Patta lands and enclosures inside the reserve are to be excluded from the lease.

545. The three bamboo coupes have been clearly marked in the working plan map. Coupe I lies partly in Puliyara reserve and partly in Kuttalam reserve while the other two coupes are situated entirely in Puliyara reserve. Out of the total area of 14,630 acres in the working circle, 10,160 acres lie in Puliyara reserve and 4,470 acres in Kuttalam reserve.

SECTION 6—OTHER REGULATIONS.

546. Artificial regeneration of bamboos will be taken up in suitable localities at the rate of 30 acres per year. The areas where bamboo is to be raised will be selected by the District Forest Officer.

547. The contractor shall be required to submit monthly accounts of the number of bamboos removed from the coupe.

548. Instances of flowering, sporadic or gregarious, should be recorded in the control journal.

549. *Control.*—The control form given at the appendix should be posted at the end of each financial year.

CHAPTER IX—WORKING PLAN FOR THE MINOR FOREST PRODUCE WORKING CIRCLE.

SECTION 1—GENERAL CONSTITUTION OF WORKING CIRCLE.

550. The minor forest produce working circle covers all the forests of the division, excluding the Singampatty forest which is already covered by the Tirunelvei South Working Plan. The principal items of the various products are tamarind, avaram bark, honey, gallnut, thatch and fodder grass, cardamom, lavangam bark, reeds, rattan, indukodi, sunfructs of palmyrah, nellikai, soapnut, etc. Besides these, a large number of medicinal herbs are collected and sent chiefy to Kerala State. In general, very little of the minor forest produce is consumed locally.

551. *Units.*—In order to widen the field of competition and to improve exploitation, each range is divided into smaller lease units called farms. The different farms and lease units are given in the following statement :—

Serial number and nature of produce. (1)	*Extent.* (2)
Sankarankoil range.	
1 All minor forest produce excluding reeds, rattan, tamarind, avaram bark, lemongrass, honey, bee's wax and palmyrah produce.	Whole range.
2 Avaram bark	Vasudevanallur reserve and T.N. Pudukudi forest.
3 Avaram bark	Sivagiri forest.
4 Tamarind	Vasudevanallur Reserve and T.N Pudukudi forest.

Serial number and nature of produce. (1)	*Extent.* (2)
Sankarankoil range—cont.	
5 Tamarind	Sivagiri forest.
6 Reed Farm I	Whole range.
7 Rattan farm	Do.
8 Lavangam bark Farm I	Do.
9 Lemon grass	Do.
10 Honey and bee's wax	Do.
11 Palmyrah produce	Do.
Shencottah range.	
12 All minor forest produce excluding reeds, rattan, honey, bee's wax and lavangam.	Whole range.
13 Reeds Farm II	Do.
14 Rattan Farm II	Do.
15 Honey and bee's wax	Do.
16 Lavangam bark Farm II	Do.
Kuttalam range.	
17 All minor forest produce excluding reeds, rattan, avaram bark, lemon grass, lavangam, honey and bee's wax.	Krishnapuram reserve.
18 Do.	Kadayanallur, Chinnakadu, Vadagarai melpidagai and Vadagarai kilpidagai reserves.
19 Do.	Kuttalam reserves.
20 All Minor Forest Produce	Chokkampatti forest.
21 Do.	Uthumalai forest.
22 Do.	Vairavankulam forest.
23 Reeds Farm III	Krishnapuram, Kadayanallur and Chinnakadu reserves.
24 Rattan Farm II	Vadagarai melpidagai and Vadagarai kilpidagai reserves.
25 Rattan Farm III	Kuttalam reserve.
26 Lavangam bark Farm III	Whole range.
27 Avaram bark	Do.
28 Lemongrass	Do.
29 Honey and bee's wax	Do.
Ambasamudram range.	
30 All minor forest produce excluding rattan, reeds, tamarind, wild cardamom, honey, bee's wax, palmyrah and coconut produce.	Mundanthorai and Upper Dam sections.
31 Do.	Papanasam and Sivasailam Sections.
32 Rattan Farm IV	Mundanthorai and Upper Dam sections.
33 Rattan Farm V	Papanasam and Sivasailam Sections.
34 Reeds Farm IV	Mundanthorai and Upper Dam Sections.
35 Reeds Farm V	Papanasam and Sivasailam Sections.
36 Lavangam bark Farm IV	Mundanthorai and Upper Dam Sections.
37 Lavangam bark Farm V	Papanasam and Sivasailam Sections.
38 Wild Cardamom	Mundanthorai and Upper Dam Sections.
39 Wild Cardaom	Papanasam and Sivasailam Sections.
40 Palmyrah and coconut produce	Do.
41 Avaram bark	Whole Range.
42 Lemongrass	Do.

SECTION 2—METHOD OF EXPLOITATION.

552. Deer and sambhur horns will be collected departmentally.

553. All minor forest produce, excluding remains of dead animals, will be exploited through the agency of contratcors by sale in open auction, during the month of May. The lease period will be one year from 1t July to 30th June.

554. Departmental exploitation shall, under no circumstances be undertaken Bamboos are excluded from this working circle.

Rotation for reeds, rattan and lavangam bark.

555. Reeds, canes and trees of Lavangam (*Cinnamomum species*) have found it difficult to recover from the strains of annual exploitation with the result, fall in yield and damage to the crop have been appreciable. In future these will be expolited once in five years so that a rest for four years will follow after each spell of exploitation. Accordingly, each of them is divided into five units or farms, to be exploited in cyclic rotation. Thus, Farm I under all the three items will be exploited in 1961–62, and Farm II under all the three items in 1962-63, and so on. If in any year, a farm remains unsold it shall not be put up for auction in the following year as an arrear lease unit.

556. The following statement gives the farms to be exploited each year :—

Year of working.	*Farm to be worked.*		
	Lavangam.	*Reeds.*	*Rattan.*
(1)	(2)	(3)	(4)
1961–62	I	I	I
1962–63	II	II	II
1963–64	III	III	III
1964–65	IV	IV	IV
1965–66	V	V	V
1966–67	I	I	I
1967–68	II	II	II
1968–69	III	III	III
1969–70	IV	IV	IV
1970–71	V	V	V
1971–72	I	I	I
1972–73	II	II	II
1973–74	III	III	III
1974–75	IV	IV	IV

557. As a further precaution against killing Lavangam trees by complete debarking, the following additional conditions shall be enforced :—

1. Trees below five feet in girth should not be debarked.

2. One continuous strip of bark not less than 18 inches, in width should be left in tact on any side of the trunk from the bottom straight upwards. On the branches, this strip should not be less than one-third girth of the branches debarked.

558. Canes shall not be uprooted, but cut at a height of not less than 12 inches from ground level. Only mature canes of over one year old may be cut.

559. All minor forest produce other than lavangam bark, reeds, and rattan will be exploited annually over the entire area.

SECTION 3—SUBSIDIARY MEASURES OF IMPROVEMENTS.

560. As an economic forest produce, tamarind is gaining importance day by day It is also a species most easily raised by direct sowing. Areas getting rain both from the south-west and north-east monsoons, and consequently where the summer is not severe, offer the most favourable conditions for the species. Unlike in the plains, seedlings have no fear of getting killed in the long summer heat. Therefore, to increase the tamarind wealth of the forests, artificial regeneration will be undertaken.

561. With the beginning of the south-west monsoon, tamarind seeds will be dibbled in felled coupes at the rate of six seeds at each stake and sowings will be done at regular espacement of 33 feet by 33 feet, after preparing pits. Into each pit six seeds will be sown and covered with soil. Nature will do the rest. This work should be done in the month of May-June as soon as the monsoon breaks, and should be done under the personal supervision of the District Forest Officer in Koilteri series and of the Range Officers in other series.

562. The following series will be given this treatment since they get the benefit of both the monsoons :—

Name of series.	*Range.*
(1)	(2)
1 Koilteri Timber-cum fuel series	Ambasamudram.
2 Koraiar Fuel series	Do.
3 Muthalamparai Fuel Series	Kuttalam.
4 Chinnakadu Fuel series	Do.
5 Puliangudi Timber-cum Fuel series	Sankarankoil.

SECTION 4—OTHER REGULATIONS.

563. The control forms and register of yield should be posted every year at the end of the lease period Control forms for this working circle will be found in the Appendix.

CHAPTER X—MISCELLANEOUS REGULATIONS.

SECTION 1—GRAZING.

564. Grazing in Singampatty forest is controlled by the prescriptions of Tirunelveli South Working Plan; therefore, the prescriptions in this plan will apply only to the rest of the division. However, in general, the evergreen forests and all areas above the 2,000 feet contour are kept out of grazing since these areas are neither visited by

cattle nor is it desirable to allow cattle to the catchment areas. In addition to these, certain specified areas will also be closed to grazing from time to time for silvicultural or other reasons. Such areas will fall under the following two categories:—

(i) Areas closed for specific periods under the provisions of this plan; and

(ii) Areas temporarily closed to grazing under the provisions of the Forest Manual.

565. For silvicultural reasons, the following areas will be closed to grazing:—

(i) All teak plantations will remain closed to grazing for a period of five years from the time of planting;

(ii) All matchwood plantations will be closed to grazing for a period of five years from the time of formation;

(iii) Fuel coupes and timber-*cum*-fuel coupes will be closed to grazing for a period of five years from the year of felling.

(iv) All sandal regeneration areas will be closed to grazing for a period of ten years from the time of sowing. This will not apply to areas where sandal seeds are merely broadcast sown.

(v) Fuel forests where afforestation works are carried out will remain closed to grazing for five years from the time of planting; and

(vi) Areas planted under the faggotwood working circle will remain closed to grazing for a period of five years from the year of planting.

566. The District Forest Officer may temporarily close any area for a definite purpose. Areas wantonly burnt by villagers or grazers may be closed to grazing under powers given to the District Forest Officer in the Forest Manual, if he is satisfied that it will be practicable to enforce the restriction. If it is desired to close any such burnt area, it will be done within two weeks of the fire, since any closure afterwards defeats the very object.

567. The annual grazing notification should be published in the month of May, specifying the areas closed to grazing and the conditions regulating the grazing in various parts of the division.

568. *Method of treatment.*—All animals, except goats, may be licensed to graze inside the forest. Grazing will be open to cattle covered by grazing permits. Cattle taken along recognised paths and roads into estates and patta lands inside the forest will not be regarded as trespass. No distinction shall be made as local and foreign cattle, in any part of the division for any purpose.

569. The following grazing fees prescribed by Government for the whole state shall be collected in this division also:—

	PER HEAD. RS.	PER HEAD. NP.
Sheep	0	12
Cows, bulls, horses and donkeys	0	25
Buffaloes	0	50
Elephant	12	00

570. A grazing permit will be valid throughout the division up to the end of the grazing year. The grazing year commences from 1st July and ends with 30th June.

571. *Penning.*—All the grazing is now confined chifly to the easily accessible slopes of the fuel forests that are close to villages. It is therefore, desirable to encourage penning so that the grazing grounds in the interior regions are also utilised. Penning of cattle within areas open to grazing shall be free and will be regulated by a penning licence to be issued by the Range Officer on requet from the person cencerned.

572. *Fodder grass.*—Free cutting and removal of fodder grass will be allowed from all areas. This free removal of grass will be governed by the following conditions:—

(i) Removal of grass may be allowed free only in headloads and that for domestic use alone.

(ii) Removals may be made all through the year, shall not be made after dust or before dawn.

(iii) Any grass removed should be presented for inspection on demand by any of the forest staff. Removals should be only through recognised roads and foot paths.

(iv) No grass shall be uprooted. It shall be cut only with sickles. Grass collectors are prohibited from carrying bill hooks or felling axes into the forest.

(v) To stiffen the grass bundle no forest produce may be cut.

573. *Concession.*—The Kanis, who have become part and parcel of the forests, will be allowed for grazing of their own cattle.

574. No limit need be fixed for the number of cattle to graze or to be penned at any locality, for, any such ceiling will only encourage illict grazing and penning the thereby a loss in revenue. Penning licences and grazing permits should be issued with the utmost promptness. It will be better if all the section foresters are empowered by the District Forest Officer to sell grazing permits. Demand for grazing permits begins in the month of July and lasts till September. Every effort should be made to make the permits available near the villages instead of making the villagers come all the way to the Range Headquarters for a few grazing permits.

575. The relavant control records will be posted at the end of each year.

SECTION 2—SANDALWOOD.

576. Out side the sandalwood working circle, in some parts of Ambasamudram range sandalwood grows in patches. Some of these patches fall within areas destined to be clearfelled and planted with matchwood and teak, under the Padarmalai matchwood series and Mundanthorai teak series. The existing sandal trees cannot be expected to survice the burn that is given to the felled areas preparatory to planting. Any dead sandalwood trees above 3 inches in girth in the regeneration areas shall be extracted by the department.

577. Dead sandalwood trees extracted from the regeneration areas will also be disposed of in the same manner as provided for in the sandalwood working circle.

578. Marking, uprooting, rough cleaning and accounting shall be done departmentally in accordance with the sandalwood extraction rules.

579. The yield figures under this operation will be entred in the control form given for the sandalwood workinkg circle.

SECTION 3—GLUTA TRAVANCORICA PLANTATION.

580. Between 1910 and 1917, lot of artificial regeneation works were carried out in the evergreen forests around Kannikatty. Most of them produced spectacular results, but after 1925 they were almost forgotten. The one species that was patronised by all was *Gluta travancorica* because it has got a beautiful wood. There now remains one compact little plantation of this species to the left of the road leading from the lower rest house to the upper rest house at Kannikatty. This was raised in 1914 by dibbling seeds of *Gulta traxancorica* under a light evergreen shade in a Kani clearing. It is now covered up with thick undergrowth and difficult to recognise without the stone slab which shows the year of formation. The crop is quite congested though the poles and straight and clean. Probably this is the oldest and first of the *Gluta* plantations to be raised in the country and it will be a valuable bit of forest to be preserved for ever.

581. This plantation should be handed over to the State Silviculturist for constitution into a Preservation or sample plot. Due to long neglect, the boundaries of the plantation are no more recognisable. The boundary will be cleared again at an early date and cairns at frequent intervals shall be erected before the plantation is handed over to the Silviculturist.

SECTION 4—PRESERVATION OF WILD LIFE.

582. The Mundanthorai plateau has long been known for big game especially tigers, sambhur and spotted deer. But the present population of game is only a fraction of what it was and wild life has become very scarce due to the over indulgence by a few people who come on jeeps and cars. Tigers and deer frequent the main road and the feeder roads like the Tharvitttamparai road and Puckles path. The forest subordinates who spent the whole day in the field are unable to apprehend the offenders at night on foot since the offenders have always the advantage of their jeep or car over the subordinate. A good beginning has been made from 1957 to overcome this difficulty, by opening a checking station at Papanasam. The checking station is now being manned by a forest guard and watcher of the beats who take duty by turn. A full time forest guard and watcher should be empolyed for this checking station if it were to be really effective. The sentry in the checking station will maintain a register in which the vehicle number that enter the area during the night will be recorded. The time at which the vehicle passed the gate will also be recorded. The sentry will examine the vehicle for fire arms or any illicitly removed forest produce or shot animals whenever the vehicle crosses the gate.

583. As a further step, it is suggested that the Mundanthorai plateau be constituted into a Wild Life Sanctuary at an early date. The nature of vegetation, climate, abundant water supply, and the terrain create ideal conditions for wild life. The picturesque country, pleasant climate and the hydro-electrical constructions have become great attractions to touriss and local sight seers. It will, therefore, be fitting

to make the Mundanthorai pleateau more attractive by making it a wild sanctuary. Conditions are quite suitable for new species like the Nilgai, Pea fowl and Bison on the Mundanthorai pleateau and for Black Buck and Pea Fowl in the Uthumalai forests.

SECTION 5—FIRE PRODUCTION.

584. Fires are a regular annual problem in the division, during February to June. The outer slopes, up to an elevation of about 1,000 feet, are the worst affected by fire because of the topography and grazing interests. Interior regions like the Mundanthorai plateau get burnt less frequently, and the fires are never severe because of the south-west showers, that fall now and then during the summer months. Almost all the fires are caused by graziers and accident is rarely a cause. In a year when the south-west monsoon is late or when the summer is sever, damage due to forest fires is extensive as well as severe. Generally, even the outer lopes above the 2,000 feet mark are not burnt since the south-west monsoon extends its effect even to that region.

585 .Fire protective measures prescribed are (i) indirect measures involving no expenditure and aiming at the removal of the temptation or opportunity to burn the forest wilfully; (ii) Firefighting measures to extinguish or localise the fires after they have broken out; (iii) direct or precautionary measures by removing inflamable materials from definite places in the forest.

586. The indirect measures to deal with wilful fires consist of prompt and effective closure for a specified period of all areas burnt wilfully and unauthorisedly. This will have a deterrent effect on the graziers and others who have a temptation for unauthorised burning to replace the coarse grass with tender shoots during summer when other grazing facilities are not available. Minor forest produce contractors have also the habit of burning the forest to collect gallnuts easily. This is an act difficult to detect and check; but heavily fines and suspension of the lease, when an offender is detected, should discourage the practice.

587. *Fire-fighting.*—Immediately the outbreak of fire in the forest is noticed, the local subordinates will, regardless of what time of the day it is, collect a sufficient number of men, go to the spot and extinguish the fire either by throwing earth on it, or by beating it out with branches or by counterfiring. An attempt should be made to put out every fire that had been noticed or brought notice, irrespective of whether the fire was harmless or uncontrollable. Fire occurrence reports will be submitted to the District Forest Officer in accordance with the standing orders. Every attempt should be made to trace the cause of fire and the offender if it is a wilful burning.

588. *Direct methods.*—These precautionary methods will consist of fire tracing of certain lines and maintenance of a net-work of internal and exterior lines. Even under the most elaborate system of fire lines a forest may not be fire proof, but they are beneficial in localising the fire to definite parts of the forest and in confining the damage to smaller areas.

(i) *Major boundaries.*—Prior to taking over the estate forests, there existed a net work of boundaries between the Government forests and the Zamin forests. These were maintained as boundaries and fire lines since most of the fires could be traced to the estate forests for origin: Maintaining these old fire lines even after the estate forests were taken over has proved to be beneficial in localising and reducing fires. From the outer edge of the boundary, these lines are 60 feet wide. An outer guide line 10 feet wide and an inner guide line of the same width and parallel to it will be cut of all growth. The cut materials will be heaped in the middle portion of the uncleared boundary and burnt. This work will be completed before the end of February.

The following are the major fire lines to be cleared annually in the division :—

Serial number and name of fire line. (1)	*Length,* (2)	
	M.	F.
Sankarankoil range.		
1 T.N. Pudukudi-Vasudevanallur R.F.	3	4
Kuttalam range.		
2 Chokkampatti Forest—Krishnapuram R.F.	3	2
3 Vairavankulam Forest—Krishnapuram R.F. Northern boundary	2	4
4 Vairavankulam Forest Southern boundary—Kadayanallur R.F.	2	4
5 Vadagari Kilpidagai—Vellakalteri R.L	2	4
6 Western boundary of Vadagarai—Melpidagai Forest	2	0
7 Boundary between Kuttalam R.F. and Puliyara R.F.	1	4
Ambasamudram range.		
8 Boundary between Reserve Forest and Western boundary of Katlamalai Estate up to Melakosu odai.	5	0
9 Aladiyur beat—Singampatty forest fire line	4	4

(ii) *Roads and paths.*—It is advantageous to build up a set of interior fire lines with the aid of existing roads and paths. In the case of roads, a guide line ten feet wide will be cut on either side beyond the side drains. All grass and shrubs in this line will be cut and heaped in the centre of the guide line and burnt, when dry. In the case of paths, after allowing six feet width for the path, 3 feet wide guide lines will be cleared on either side of the cut materials will be heaped in lines and burnt. Only important paths and roads passing through the vulnerable areas need be cleared in this manner.

The following table gives a list of roads and paths to be fire traced in the division :—

Serial number and road or path. (1)	*Length.* (2)	
	M.	F.
Kuttalam range.		
1 Puckles path	3	4
2 Thekkumalai estate path	2	3
3 Vallam path	1	4
4 Krishnapuram valley path	4	6
5 Kottamalai valley path (Kadayanallur Resceved Forest)	3	0
Ambasamudramu range.		
6 Road from Filter house to Upper Dam	5	0
7 Mundanthorai to Tharvittamparai Road	2	4
8 Puckles path	1	4
9 Upper dam to Tharvittamparai Road	2	4
Shencottah range.		
10 Kannupuli-Karungalodai Road	3	3

589. *Fire patrols.*—To assist the subordinates in existing fires and forestalling fires, fire patrols will be employed in the division annually for a period of three months from 1st February to 30th April. There will be six fire patrols for Ambasamudram Range and five for Kuttalam Range. The fire patrols will be utilised in Sivasailam, Papanasam, Mundanthorai, Kuttalam and Kadayanallur sections of the two ranges.

590. *Fire maps.*—Fire maps on a scale of 1 inch to 1 mile will be maintained separately for each range. Every case of fire will be marked on the map, serial numbers being given to the fires in chronological order. The dates of fires will also be shown on the maps. One set of maps will be used for five successive year, the fires of each year shown in distinctively separate colours or symbols.

SECTION 6—ROADS.

591. All roads and bridges, whether used or not, should be maintained in good condition. During the annual repairs to roads, wherever possible, the progressive improvement in width and surface should be aimed at in order to allow cars and lorries. As an additional measure of fire protection, the surface of roads should be kept clear of inflamable materials during the fire season by collecting the dried materials to the centre of the road and burning them. All repairs should be done at the beginning of the monsoon or at the end of the rains. In the case of unmetalled and metalled roads, the repairs will consist of filling in ruts and pots holes, repairing damaged culverts and retaining walls, cleaning side drains and cutting down all growth to the existing width.

592. The following roads and paths will be repaired every year for their full length :—

Serial number and Road or paths. (1)	*Length.* (2)	
	M.	F.
Kuttalam range.		
1 Shenbagadevi path	2	1
2 Thekkumalai path	2	3
3 Kottantheri road	2	3
4 Puckles path	3	4
5 Vallam path	1	4

Serial number and Road or paths. (1)	*Length.* (2) M.	F.
Ambasamudram range.		
6 Kannikatty-Kalivelipul path	3	4
7 Moolagaiam Tharavittanparai Road	2	5
8 Kannikatty Martin's Hut	6	3
9 Pechiammankoil-Kooduparai **Road**	5	7
10 Mundanthorai-Kodamadi Road	6	6
11 Kodamadi-Knapp's Hut	7	5
12 Knapp's Hut-Wood's Hut	2	3
13 Wood's Hut-Cox's Hut	10	0
14 Cox's Hut-Kooduparai	7	0
15 Kariar-Kannikatty Road	7	3
16 Puckle's path	1	4
Shencottah range.		
17 Kannupuli-Karungalodai Road	3	3

593. The road from Mundanthorai to Kodamady, from Pechiammankoil to Kooduparai and from Kariar to Kannikatty should be metalled during the period of this plan. A portion of the road from Kodamadi to Wood's Hut is already wide enough for a jeep to go. The distal portion of about five miles, if widened, will make access to the evergreen forests much easier. This portion of the road will therefore be improved and made fit for motor traffic.

594. The bridle paths and roads in the evergreen forests are now blocked at several places by wind blown and uprooted trees lying across. At some places, especially along the Wood's Hut-Cox's Hut path, the path has to be widened and levelled. These paths should be repaired under special estimates.

595. The boundary line between Singampatty forest and Pattavarayankoil forest in Ambasamudram range is already wide and will be suitable for traffic with some improvements. The total length of about 2 miles should be made into a motorable road joining the Sorimuthenkoil road, as it would connect about a thousand acres of teak plantations. This will be undertaken during the period of this plan.

SECTION 7—BUILDINGS.

596. A list of buildings in the division is already given under Chapter V of Part I. All of them will be maintained in good condition. The surroundings of offices, rest houses and residential quarters must be kept clean of undergrowth as an anti-malarial measure and as a measure of fire protection.

597. The Range Inspection shed at Kuttalam requires improvement. Sanitary arrangements of permanent type and electrification of the building are essential. The subordinates' quarters at Kuttalam, Papanasam and Mundanthorai will be electrified during the period of this plan.

598. Quarters for Foresters, Guards and Watchers engaged in matchwood planting and for the subordinates of Sivagiri section are essential, in view of the arduous nature of their work. Amenities of this kind will greatly increase their efficiency. The Forest Guards' line at Mundanthorai constructed in 1903 at a cost of Rs. 800 is now unfit for habitation. A new line of quarters should be built at an early date.

599. The Ambasamudram range Officer has already been given away to the Medical Department and efforts are now being made to take away even the Ranger's residence. If this materialises, a new Range Officer and Ranger's residence will be built at Lower Camp. This will be a central place and more convenient for the Range Officer himself to have a better control over the range. Postal and medical facilities available at lower Camp together with the numerous members of the Electricity Department staff in the middle of the forest, make the place ideal for a range headquarters.

600. Quarters and office for the Sankarankoil range will be constructed at an early date during the period of this plan.

601. In building new quarters, care should be taken to select sites close to villages and where there are wells nearby, lest they should lie unoccupied as in the case of some buildings of Sankarankoil range. The flooring and steps of most of the subordinates' quarters are made of old tiles or mud plaster. This involves frequent repairs. It is suggested that all flooring be changed into one of cement by taking up two or three quarters every year. In the long run this will be cheeper and will give better convenience to the occupants.

602. The rest house at Sivasailam needs improvement, especially on the floor and roof. The rest house at Pulivara in Shencottah range is almost unoccupied by any one. **It will, therefore, be improved and given to the subordinates of the section to live in.**

SECTION 8—BOUNDARIES.

603. The common boundry between Kerala State and Madras State is taken along the water shed and does not require inspections or clearance.

604. The reserve boundaries, for which no special provision is made, will be cleared and maintained by the local beat subordinates. The cairns and pillars on the boundary lines should be kept in good condition. Cairns missing should be reconstructed with the aid of corresponding reserve maps. Soon after sanction by the competent authority, all changes in the boundary will be rarked annually in the record copy maintained in the District Forest Office.

605. The ex-estate forests of Sivagiri, Uthumalai, Chokkampatti, Vairavankulam, Okkanindran Pothai, Vellakalparambu, T.N. Pudukudi and Singampatti have to be surveyed and constituted into reserved forests under section 26 of the Madras Forest Act. This can be done when the Assistant Conservator of Forests in charge of survey and demarcation taken up the forests of this district. Along with the above ex-estate forests, the Mayamankurichi reserve land also will be surveyed and notified under section 26 of the Forest Act.

606. The Puliyara reserve forest was a notified forest of Kerala State; but so far the settlement records have not been transferred to this State. Cairns and pillars along the boundary line can be seen here and there, but at several places, adjoining patta lands, the cairns are not to be seen. The reserve itself is riddled with numerous patta lands, cultivations and topes whose boundaries are not demarcated by any survey stones. These enclosures will have to be surveyed and demarcated and the reserve itself has to be notified under the Madras Forest Act.

607. Likewise, in Sivagiri forest are six cardamom estates covering an approximate area of 683 acres. The list of these estates is given in the appendix. As soon as the Settlement Officer pronounces judgment on their legal position a special staff will have to be employed to survey and demarcate them, since there is nothing definite about their extents at present.

SECTION 9—MISCELLANEOUS TEAK PLANTATIONS.

608. There are two small teak plantations not included in the teak working circle since their growth is very poor and the plantations themselves lie isolated. One is the Sivasailam teak plantation of unknown year and area; and the other is the plantation near the Kilowatt transmission line raise in 1935 over 1.50 acres in Puliyara reserve. These will be clearfelled and planted with Eucalyptus species, at an espacement of six feet by six feet in the month of June.

SECTION 10—INSPECTION PATHS IN PLANTATIONS.

609. In every plantation of more than 50 acres in extent, inspection paths of 10 feet wide running diagonally to the site will be formed at the time of aligning and staking. No stumps or plants should be put in along these paths. Stumps of trees and boulders should be cleared off the track to make it fit for motor traffic.

SECTION 11—CARDAMOM LEASES.

610. The areas suitable for cardamom cultivation had been marked in the working plan maps. Arrangements for leasing out the areas may be made in accordance with the instructions in force.

SECTION 12—FAGGOTWOOD REMOVAL.

611: Prior to 1957, when Shencottah taluk was under Kerala State, people enjoyed the right to take free firewood and grass from any part of the forest as they liked. However, in 1957, when the Shencottah forests were transferred to Madras State under general reorganisation of the States, the traditional rules and regulations of the Madras Forest Department were applied to them also. As most of the people who exercised this right made their living out of it, this sudden change over to the new atmosphere and restrictions brought forth a wave of representations and protests from the public upon this, in G.O. Ms. No. 3888, Food and Agriculture, dated 20th December 1957 Government laid down a policy of gradual integration.

Free and unrestricted removal of firewood is desirable silviculturally. But in order that there may not be a sudden stoppage of a system which was in vogue, it is prescribed that removal of free firewood will be allowed on permit in areas where the system was prevailing. But permits will be given only to those who were availing themselves of the concession in the past and no fresh permit will be given to any one. It is hoped that in due course this system will lie down and the right extinguished slowly.

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SECTION 13—CONTROL.

612. *The Control Journal.*—The object of this journal is to place on record important observations and comments of the District Forest Officer on all aspects of the divisional administration. Statistics of yield and revenue which are available in the control forms should not be repeated here. The headings under which the journal is to be written is given in the Appendix. Additional headings may be added by the District Forest Officer while writing up the journal. The journal will be written personally by the District Forest Officer at the end of each year. The journal will be maintained in one bound note book wherein 10 to 15 pages will be allotted for each heading. A summary of annual revenue and expenditure in a form to facilitate comparison with the financial forecast of this plan will also be recorded every year in the form given in the Appendix.

613. *The Control Book and the Record of Works.*—Sample control forms for each working circle are given in the Appendix so that details regarding the exploitation and yield of prescribed items and the works carried out in each working circle other than the main exploitation operations may be recorded. Separate forms, for measures prescribed, for measures suggested and for measures neither prescribed nor suggested, should be used while compling the record of works. The control forms, record of works and deviation statement should be written up at the end of each year. A copy of them should be submitted annually to the Controlling Authority.

CHAPTER XI—ESTABLISHMENT AND LABOUR.

SECTION 1—ESTABLISHMENT.

614. Annually, an area of about 100 acres is to be planted with teak near Mundanthorai under this working plan. The section Forester is already fully engaged in road and building works, fuel coupes and assisting in matchwood plantations. In order to supervise and carry out all the works in teak plantations the presence of a Forester is essential. He will require the assistance of a Forest Guard also since works will be going on all through the year at least in two different plantations.

615. Now, there is a small beat at Mundanthorai used by the staff to cross the Tamaraparani river over to Aladiyur. The Mundanthorai bungalow watcher acts as a boatman as well as the bungalow watcher. The result is that he is able to discharge neither of the duties properly. With the starting of the Mundanthorai teak plantations a full time boatman will be required to take the staff, and labour daily across the river which has not got a bridge. This boatman may be engaged on daily labour under the head regeneration works for account purposes.

616. At present there are two forest guards in charge of Molagarachanparai beat of Shencottah range. It is suggested that one of the guards be posted as Assistant to the Forester in charge of Mundanthorai teak plantations and a watcher be posted in his place to the beat.

617. For Kannupuli beat there are two forest Guards instead of a guard and a watcher. It is suggested that one of the guards be posted in charge of the checking station at Papanasam and that one watcher be sanctioned for the beat.

618. As the custom was in Shencottah range, Vellakaltheri beat and Mekkara beat still continue to be under the charge of two forest guards each. It will be better to place each beat in charge of a forest guard and a watcher.

619. At present there is no watcher for Thondi beat in Shencottah range. A beat watcher is necessary.

620. Judgment on the status of cardamom estates in Sivagiri forests is about to be pronounced by the Settlement Officer. If they are declared as patta lands or as leased lands, the department will have to survey, demarcate and arrive at the area of each estate. This work entails a full time officer of at least the rank of a Range Officer for six months who has to camp in the interior regions. This question may be taken up soon after the Settlement Officer gives his decision.

621. *Ambasamudram Range.*—With the increased planting and building activities under this plan and the addition of a part of Singampatty forests where also planting work is to be done, Ambasamudram Range becomes very heavy for one Range Officer to manage. An assistant Range Officer will be necessary in the interest of efficient control and execution of works. The Assistant may be given responsibility over roads, buildings, fire protection works and the like, with the provision that he will submit his cash accounts direct to the District Forest Officer.

622. *Office staff.*—The strength of office staff is already given in Chapter IV of Part I. The annual revenue of the division is in the order of over six lakhs and all the complicated correspondence is now handled by a lower division clerk. Often contractors come up with intricate problems which involve a high standard in dealing with them. It is, therefore, necessary in the interest of the office that lease clerk should be an Upper Division Clerk.

623. There is an increased planting programme under this plan. In addition, under the third five-year plan many more works are going to be taken up. The appointment of one lower division clerk in addition to the present staff will be necessary from 1961.

SECTION 2—LABOUR.

624. Labour presents problems in the matchwood planting areas of Sivagiri in view of the long distance they have to walk and the risk exposed to malaria. People are not very eager even to take up free kumri cultivation. It is, therefore, suggested that a kind of subsidy be given to the kumridars who clear, burn and plant up the kumri areas, in matchwood series. This will offset the expenditure involved in combating weeds without kumri cultivation.

625. Generally, there is no difficulty in getting labour for other works.

CHAPTER XII—FINANCIAL FORECAST AND COST OF THE WORKING PLAN.

SECTION 1—FINANCIAL FORECAST.

626. The estimated revenue and expenditure under each working circle for the period of this plan are given in the following statement :—

1. *The Teak Working Circle.*

Year.	*Revenue in Rupees.* (2)	*Expenditure in Rupees.* (3)
1961–62	1,12,350	10,800
1962–63	1,27,110	9,500
1963–64	91,050	10,300
1964–65	71,050	9,580
1965–66	76,850	10,100
1966–67	76,840	9,200
1967 68	87,650	10,100
1968–69	1,03,650	10,590
1969–70	1,02,500	11,210
1970–71	94,100	10,190

2. *The Matchwood Working Circle.*

1961–62	1,35,200	16,040
1962–63	1,26,200	18,240
1963–64	1,13,600	18,210
1964–65	1,26,800	17,680
1965–66	1,35,800	17,530
1966–67	1,13,000	17,960
1967–68	1,07,600	18,760
1968–69	1,13,600	17,120
1969–70	1,24,400	17,510
1970–71	1,22,600	18,530

3. *The Fuel Working Circle.*

1961–62	1,43,070	1,200
1962–63	1,36,800	1,200
1963–64	1,40,790	1,200
1964–65	1,31,500	1,200
1965–66	1,42,690	1,200
1966–67	1,36,800	1,200
1967–68	1,77,630	1,200
1968–69	1,34,330	1,200
1969–70	1,37,560	1,200
1970–71	1,42,310	1,200

4. *The Timber-cum-Fuel Working Circle.*

1961–62	95,500	360
1962–63	80,100	360
1963–64	77,500	360
1964–65	97,800	360
1965–66	92,400	360
1966–67	95,800	360
1967–68	92,700	360
1968–69	90,700	360
1969–70	93,500	360
1970–71	86,900	360

5. *The Afforestation Working Circle.*—Annually an expenditure of Rs. 3,000 is expected. No revenue is anticipated.

6. *The Sandalwood Working Circle.*—Annually a revenue of Rs. 4,000 and an expenditure of Rs. 250 are expected.

7. *The Bamboo Working Circle.*—An annual income of Rs. 1,400 is expected. No expenditure is anticipated.

8. *The Minor Forest Produce Working Circle.*—An annual revenue of Rs. 13,000 and an expenditure of Rs. 100 are expected.

9. *Miscellaneous items.*—The annual revenue and expenditure are anticipated to be as follows :—

Item.	*Revenue in rupees.*	*Expenditure in rupees.*
(1)	(2)	(3)
Grazing	6,000	..
Fire Protection	..	1,200
Roads	..	20,000
Buildings	..	15,000
Boundary corrections	..	500
Establishment charges	..	1,69,900
Contingencies	..	6,000
Maintenance of jeep	..	3,000
Share of Singampatty Forest	30,000	6,000

10. *Abstract of the forecast.*—The total revenue and expenditure for the whole division for each year is estimated to be as follows :—

Year.	*Revenue in rupees.*	*Expenditure in rupees.*	*Surplus in rupees.*
(1)	(2)	(3)	(4)
1961–62	6,24,520	2,53,430	3,71,090
1962–63	6,08,610	2,56,130	3,52,480
1963–64	5,61,340	2,59,350	3,03,990
1964–65	5,76,750	2,56,340	3,20,410
1965–66	5,97,340	2,56,770	3,40,570
1966–67	5,72,040	2,56,300	3,15,740
1967–68	6,13,980	2,58,000	3,55,980
1968–69	5,11,680	2,56,610	2,55,070
1969–70	5,27,360	2,57,560	2,69,800
1970–71	5,15,310	2,57,560	2,57,750

627. From the above abstract it will be seen that on the average Tirunelveli North Division will have an annual surplus of about 3.2 lakhs of rupees.

SECTION 2—COST OF THE WORKING PLAN.

628. The cost of preparing this Working Plan is given below :—

Particulars.	*Expenditure.* RS. NP.
(1)	(2)
Pay of Officers	10,618·81
Pay of Establishment	17,248·73
Dearness Allowance	10,768·88
Other Compensatory Allowance	1,230·31
Travelling Allowance	7,487·35
Fixed Travelling Allowance	2,538·72
Contingencies	3,287·83
Field Work	852·32
Total	54,032·95

629. One Working Plan Officer in the category of Assistant Conservator of Forests, two Rangers, five Foresters, one Lower Division Clerk and four peons formed the establishment of this Working Plan Division. For some time there were seven Foresters, but for most of the time only five Foresters were on duty.

630. The Working Plan Division was formed on 15th November 1958 and closed on 15th September 1960.

SUMMARY OF PRESCRIPTIONS

Chapter I—Basis of Proposals

PARAGRAPHS.

Scope.—The Working Plan covers the Tirunelveli North Division excluding Singampatti Forests 304

Objects of Management.—The objects of management are (1) to raise plantations of teak for electric transmission poles and matchwood to supply to the match factories, (2) to exploit the timber firewood, bamboo, sandal and minor forest produce resources of the forest in conformity with silvicultural principles, (3) to raise plantations of fuel and other useful species, (4) to meet the domestic and grazing requirements of the public, (5) to protect and preserve the forests in the catchment areas of the river system, and (6) to provide better accommodation facilities to subordinates and to improve the roads in the division ... 305

PARAGRAPHS.

Agency of Exploit.—Planting, tending and clearfelling in teak plantations will be done departmentally. Expliotation of all other produce will be done through the agency of contractors 306

Working Circles.—The following working circles have been constituted :— 307

(1)	ACRES. (2)
1 The Teak Working Circle	2,620
2 The Matchwood Working Circle	5,599
3 The Fuel Working Circle	22,123
4 The Timber-*cum*-Fuel Working Circle	11,192
5 Sandalwood Working Circle	1,045
6 The Bamboo Woking Circle	14,630
7 The Minor Forest Produce Working Circle	206,451
8 The Afforestation Working Circle	2,401

Period of the Working Plan.—The working Plan will be in force for a period of ten years from 1st April 1961 to 31st March 1971. As a measure to tide over any delay in taking up the revision in time, areas to be worked in succeeding five years also have been indicated ... 308

Chapter II—The Teak Working Circle.

Constitution of the Working Circle.—This working circle includes all the successful teak plantations and the area proposed for conversion. A list of the plantations is given in Appendix V 309

Area of the Working Circle.—The total area of the working circle is 2,620 acres of which 1,591 acres are already under teak 310

Division of the area.—The teak plantations are located in Ambasamudram, Kuttalam and Shencottah ranges. There will be one series for the working circle and plantations will be identified by the name of its locality ... ... 311 to 314

Analysis of the crop.—The Teak planting commenced in the division in 1912 but no attempt was made to create a regular series. The best plantation is that of 1941 in Kuttalam range. The Pattavarayankoil forest will be clearfelled and planted with teak during the period of this working plan. The site is a deep sandy loam containing good natural teak ... ... 315 to 317

There is great demand for electric transmission poles. Local teak is of the fourth All-India quality class, and yet it fetches very good prices. Our object is to grow a low quality teak as nature permits and the market wants 318

Annually an area of about 100 acres will be clearfelled and planted 319

Silvicultural system.—The system adopted is the clearfelling system followed by concentrated artificial regeneration 320

Rotation.—The rotation is fixed at 40 years as by this age the teak poles reach the size of electric transmission poles. The general quality class of the local teak falls between a high IV quality and a low III quality. But diameter growth is good ... ... 321 to 323

Choice of species.—Teak will be planted over 324 the entire area. In Swampy patches Eucalyptus species will be planted 324

Yield.—Yield will be regulated by area 325

Method of executing the Fellings.—Areas destined for conversion will be exploited through the agency of contractors and all plantations which are to be clearfelled will be exploited departmentally. The lease period will be 1st January to 31st December ... ... 326 to 330

Prescriptions for conversion and standard classification of timber are given ... ... 331 to 335

Areas to be taken up annually for clearfelling and planting are given in a statement ... ... 336 to 338

Regeneration operations.—The unsaleable growth will be cleared and burnt twice by the end of March ... ... 339 to 341

	PARAGRAPHS.
Aligning and staking at six feet by six feet.	342
One year old teak stumps will be planted flush with ground level during premonsoon showers between 15th May and first week of June	342 to 345
Planting should be quick. Cent per cent stocking to be achieved before the end of July by replacing casualties consistently. Multiple shoots should be clipped early. No departmental kumri to be done, but kumri cultivation by people may be allowed	346 to 351
There will be three weedings in the first year, two weedings in the second year and one tending in the third year. No pruning will be done	352 to 358
Details of nursery are given. Seeds from the local stunted variety should be avoided. Seeds may be collected from the Kuttalam plantations of over 25 years of age or from seelcted mother trees in natural forests	359 to 364
Thinning.—The thinning cycle and intensity for teak grown for poles has to be different. The accelerated diameter growth comes in handy. Thinning will be done at age 6, 10, 15 and 25. The first two thinnings will be mechanical and the rest will be silvicultural. The number of stems to be left and the spacing to be achieved after each thinning are given in the statement	365 to 372
A statement showing the plantations to be thinned is given ...	373
Other Regulations.—Plantation boards should be maintained and renewed. Surveyed sketches of future plantations should be filed in the control forms. A plantation journal will be maintained for each plantation	374 to 377

Chapter III—The Matchwood Working Circle.

Constitution of the working circle.—To meet the match factories' requirement this working circle has been constituted. Matchwood planing was started in 1956	378
Total area of the working circle is 5,599 acres of which 695 acres are already under matchwood	379
Division of Area.—There will be two series of plantations; the Padarmalai series in Ambasamudram range and the Sivagiri series in Sankarankoil range. Area of Padarmalai series is 3,529 acres and Sivagiri series is 2,070 acres	380 to 384
Annually an area of 280 acres will be planted with matchwood ...	385
Analysis of the crop.—*Ailanthus excelsa* and *Salmalia malabaricum* in Ambasamudram range and *Ailanthus excelsa in Sankarankoil range* are planted at 16½ feet by 16½ feet. Planting in Sivagiri series has not been systematic	386 to 389
Method of Treatment.—The system adopted will be the clearfelling system followed by artificial regeneration	391
Choice of Species.—*Ailanthus excelsa* and *Salmalia malabaricum* will be planted as a mixture in Padarmalai series. *Ailanthus excelsa* alone will be planted in Sivagiri series	392
Rotation.—The rotation is tentatively fixed at 20 years. The reasons for it are given	393
Planting espacement.—An espacement of 16½ feet by 16½ feet will be adopted for Padarmalai series and for Sivagiri series the espacement will be 12 feet by 12 feet	394
Regulation of yield.—The yield will be regulated by area	395 and 396
Method of executing the fellings.—Areas to be clearfelled and converted into plantations will be exploited through the agency of contractors. The lease period will be one year from 1st April to 31st March. Materials of less than six inches in girth shall be left behind for a burn. If no contractor is forthcoming departmental exploitation may be undertaken	397 to 401

PARAGRAPHS.

Tabular statement of fellings.—The statement shows the extent to be clearfelled and planted every year. There is difficulty to plant large areas in Sivagiri. In order to get a complete series, an area of only 100 acres will be planted annually in Sivagiri area ... ... 402 to 407

Regulation of Regeneration operations.—Felling and burning of all unsaleable materials should be completed by April in Padarmalai series and by August in Sivagiri series. Basket seedlings of *Ailanthus excelsa* and naked transplants of *Salmalia malabaricum* will be planted. Planting season for Padarmalai series is late May and early June and for Sivagiri series it is September–October. Planting should be swift and never be delatory. Hundred per cent stocking should be achieved by replacing casualties as and when noticed. The area may be given for kumri cultivation, but not departmental kumri can be undertaken. Planting, weeding and soil working will be done departmentally ... 408 to 421

In the first year, there will be four weedings for Padarmalai series and two weedings for Sivagiri series. In the second year, Padarmalai series will receive three weedings and Sivagiri series four weedings. No weeding need be given to plants that have grown beyond the height of a man ... ... 422 to 427

Nursery.—Seedlings should be good size at the time of planting. Thick sowings of Bombax should be avoided as it results in weak seedlings which do not establish themselves. Seeds of *Ailanthus* should be sown immediately after collection ... ... 428 to 432

Subsidiary Silvicultural Regulation.—Multiple shoots should be clipped. Damaged plants to be cut back. Pupae of defoliators should be destroyed by hand ... ... 433 and 434

Other regulations.—Plantation boards will be maintained. Planted area should be calculated by actual survey and a map of each year's plantation will be filed in the control journal ... ... 435 and 436

A plantation journal should be maintained 437

Chapter IV—The fuel working circle.

Constitution of the working circle.—The working circle covers all the exploitable portions of the deciduous forests. A new series has been opened in Aladiyur beat to meet the special local requirements ... 439

Area of the working circle.—The area of the working circle is 22,123 acres 440

Division of the area.—This working circle covers Shencottah, Kuttalam, Ambasamudram and Sankarankoil ranges. For aesthetic and sentimental reasons some portions have been excluded. There will be ten felling series, of which Chinnakadu fuel series lies partly in Kuttalam range and partly in Shencottah range ... ... 441 and 442

Analysis of the crop.—The area covers the outer slopes which receive about 40 inches of rain annually Trees attain a height of 30 feet but not great dimensions due to repeated cutting. Natural regeneration is unable to regenerate the forest ... ... 443 and 444

Silvicultural system.—The Silvicultural system adopted will be the " sample coppice " system 445

Rotation.—A long rotation reduces the coppicing power of stumps and lessens the annual area to be felled, though it gives longer rest and produces bigger stems. The rotation will therefore continue to be 30 years 446

Regulation of working.—Each felling series is divided into 30 coupes of almost equal area, square in shape and the boundaries running parallel to north, south, east and west 447

All the 30 coupes for each of the series have been marked in the map 448

	PARAGRAPHS.
Method of executing the fellings.—Each year the coupe will be surveyed and demarcated by October. Trees to be reserved should be numbered and enumerated at the time of survey. Coupes will be exploited only through the agency of contractors. The lease period will be on year from 1st April. Reserved trees should be verified when the lessee vacates a coupe	449 to 453
Felling rules in detail are given	454
Coupe arears may be sold again in auction	455
Tabular statement of fellings.—Coupes to be worked in each year are shown	456
Other regulations.—Felled coupes should be demarcated with stone slabs showing the coupe number and year of working	457
Monthly statements of removals of timber and firewood should be obtained from the contractor. Total yield during the year should be entered in the control book	458
Control map should be posted at the end of each year	459

Chapter V—The timber-cum-fuel working circle.

General constitution of the working circle.—This working circle includes the better portions of deciduous forests which yield small timber and greater quantity of fuel. There are perennial streams and rivers. These were once worked under the coppice with standards system	461
Area of the working circle.—The total area of the Working Circle is 11,192 acres	462
Division of the area.—There are three series in the working circle distributed over Ambasamudram and Sankarankoil ranges	463 to 465
Analysis of the crop.—The area gets an annual rainfall of 45 inches. Trees attain a height of 40 feet and a girth of 2 to 3 feet. Natural regeneration is fair. There is a good proportion of teak	466 and 467
Silvicultural system.—The system adopted will be the 'Sample Coppice' system	468
Rotation.—In view of the better soil and rainfall and the resulting better growth a rotation of 40 years is adopted	469
Regulation of working.—Yield is regulated by area. Permanent coupe boundaries of Kombaiar series have been retained and for others the boundaries run in the direction of north, south, east and west	470
All the 40 coupes for each series have been marked in the map	471
Thinning in teak coppice.—Thinning in teak coppice shoots prescribed	472
Method of executing the fellings.—The prescriptions of fuel working circle should be followed here. Each coupe in the series will form a separate lease unit	473 and 474
Tabular statement of fellings.—Coupes to be worked in each year are given in the tabular statement	475
Other regulations.—The prescriptions of Fuel Working Circle will be followed here	476

Chapter VI—The afforestation working circle.

Constitution of the working circle.—To rehabilitate the degenerated fuel forests afforestation works were started in 1953 under the first five year plan. The object of this working circle is to have a set of prescriptions which will come in useful for works taken up under the five year plan also	477
Area of the Working Circle.—Area of the working circle is 2,402 acres of which 1,232 acres represent areas afforested so far	478

	PARAGRAPHS.
Division of area.—Afforestation works were confined to the forests of Kuttalam range so far. Future afforestation works under the working plan will be taken up on the western slope of Uthumalai forest. There will be one series to be called Uthumalai series. Afforestation under five year plans will be taken up in clearfelled coupes of Mathalamparai fuel series. Failed areas of previously afforested regions will be planted again	479 to 482
Analysis of the crop.—Afforestation works in the past were done in forests of the plains. Low rainfall, few rainy days, hard and impoverished soil are the chief features of the locality	483
The existing growth is a Carnatic Umbrella thorn forest type. General height of vegetation is about ten feet	484
With the benefit of trenches and better soil conditions, growth and survivals have been better. General stocking in the afforested aras is rather low due to adverse climate	485
Method of treatment.—Without clearfelling the growth, seedlings will be planted along cleared lines, at uniform espacement. Object is to supplement the existing stock with useful species with a view to enhancing the utility value of the forest	486
Rotation.—This will be decided at the next revision as it does not arise now	487
Choice of species.—Already the soil is poor and rainfall is low. Species are sensitive to the texture of soil. Therefore great care should be exercised in selecting the right species according to edaphic variations. Some of the suitable species are Usil, Velvel, Odai, Vagai, Neem, etc., and the types of soils best suited for them are given	488
Espacement.—The planting espacement will be 12 feet by 12 feet ...	489
Preparatory works.—After survey and demarcation four feet wide strip lines will be cleared 12 feet apart	490
Annually 100 acres will be afforested under the working plan ...	491
On level ground, pits with saucers will be adopted as water conservation	492
On sloping ground one foot deep trenches 6 feet long will be adopted	493
All preliminary works should be over before September as the planting would be done in October	494
Planting.—One year old seedlings raised in containers will be planted out deep. Planting season is from 5th to 20th October. Since the number of rainy days is very small planting should be quick ...	495
At the time of planting, seeds of Odai and Tamarind will be sown on the mounds	496
Replacing casualties.—Casualties to be replaced in two weeks after planting. Casualties in the second year will be replaced and trenches will be cleared	497 and 498
Weeding and soil working.—There will be one weeding and soil working in the first year in December. In the second year, there will be two soil workings, in July and in December	499 to 501
Nursery.—Seedlings to be raised in pots or baskets or polythene bags, preferably near the planting site. Sowings to be completed by November of the previous year	502
Other regulations.—Plantation boards will be put up at the entrance of the plantation	503
A plantation journal should be maintained	504

PARAGRAPHS.

Chapter VII—The sandalwood working circle.

Constitution of the working circle.—Sandal was first introduced near Kuttalam Temple some time in 1875 and from there it spread to the neighbouring reserve. Spike disease has not been observed so far. The working circle covers the sandal forests of Kuttalam range ... 506 to 509

Area of working circle.—Gross area of the working circle is 1,045 acres 510

Felling series.—There will be one felling series to be known as Kuttalam Sandalwood series 511

Method of treatment.—Only dead trees will be extracted. Artificial regeneration will also be undertaken ... ... 512 and 513

Felling cycle.—In order to reduce the risk of fire to sandalwood and to facilitate frequent tending of sandal trees a felling cycle of three years is adopted 514

The series is divided into three coupes 515

Yield.—Yield will be regulated by area. About a ton of sandalwood may be expected every year 516

Method of executing the felling.—Only dead trees three inches and over in girth at breast height will be extracted along with fallen pieces. Extraction will be by the department 517

The rough cleaned wood should be sent to the sandalwood depot at Tirupattur. It is not advisable to open forest depots 518

One coupe will be worked every year. Coupes to be worked annually and their boundary descriptions are given in a statement ... 520

Subsidiary silvicultural regulations.—At the time of marking trees for extraction, a tending will be given to all sandal trees of 4 feet and over in height. Climbers will be cut and all interfering branches of other species will be pollarded. Care should be taken not to remove host trees ... ... 521 and 522

Sandal propagation will be done intensively over a small area situated near Mundanthorai bungalow. The area will be divided into four strips and demarcated permanently. By turn, each year one strip will be dibbled with sandal seeds in the month of June in the presence of the District Forest Officer ... ... 523 to 527

Seeds ripen in March. Five pounds of seeds should be collected, depulped and stored 528

Other regulations.—Boundary lines of the propagation centre will be cleared annually. Each strip will be indicated by a stone slab showing the strip number 529

A journal will be maintained for the propagation centre 530

Chapter VIII—The bamboo working circle.

Constitution of the working circle.—The working circle covers all the areas in Kuttalam and Shencottah ranges where bamboo occurs in exploitable quantities. Part of Kuttalam reserve and part of Puliyara reserve form the bamboo area. There will be one series 532

Area of working circle.—The gross area of the working circle is 14,630 acres. The series will be known as Shencottah bamboo series and will be controlled by Shencottah range 533

Analysis of the crop.—*Bambusa arundinacea* is the species growing over the tract 534

The bamboo areas have been stock-mapped under three grades. There are about 35 culms in a clump 535

Cutting culms high has left congested clumps 536

Method of treatment.—There will be a selected removal of culms. A felling cycle of three years will be adopted ... ... 537 and 538

Yield will be regulated by area 539

PARAGRAPHS.

Method of executing the fellings.—One coupe will be exploited every year. No coupe may be sold out of turn even as arrear coupe. Period of lease will be one year … … … … … … 540

Felling rules are given … … … … … … 541

Fuel coupe contractors will have no right over the bamboos in any of the clear felling coupes. Exploitation will be through the agency of contractors only … … … … … … … 542 and 543

Tabular statement of fellings given … … … … … 544

Coupes are marked in working plan map … … … … 545

Other Regulations.—Artificial regeneration of bamboos will be taken up, at the rate of 30 acres per year. Contractor should submit monthly accounts. Instances of flowering should be recorded … … … 546 to 548

Chapter IX—The Minor Forest Produce Working Circle.

Constitution of the Working Circle.—The working circle covers all the forests of the division but excludes Singampatty forests. The principal items of minor forest produce are tamarind, avaram bark, honey, gallnut, grasses, lavangam, cardamom, reeds, rattan, nellikai, soapnut, usufructs of palms, medicinal herbs, etc. … … … … 550

Units.—The reserves and produce are grouped into 42 lease units or farms … … … … … … … … … … 551

Method of Exploitation.—Deer and sambhur horns will be collected departmentally … … … … … … … … 552

Other produce will be collected through the agency of contractors alone. Lease period will be one year … … … … … 553

Bamboos are excluded from this working circle … … … 554

Reeds, Rattan and Lavangam.—These will be exploited under a rotation of five years since they suffer much by annual exploitation. Each of them is diviled into five farms.

A statement shows the year in which each farm should be worked … … … … … … … … … 556

Special conditions to govern lavangam bark extraction are given … 557

Canes may be cut at a height above one foot from ground level … 558

Minor forest produce other than reeds, rattan and lavangam will be collected annually … … … … … … … 559

Measures of improvement.—Tamarind is a valuable produce worth cultivating. Tamarind seeds will be broadcast sown at the beginning of the south-west monsoon in coupes just felled. Series getting benefit of both the monsoons will be given this treatment … … … … 560 to 562

Other Regulations.—Yield figures should be posted every year … 563

Chapter X—Miscellaneous Regulations.

Grazing.—Singampatty forests are not covered by the prescriptions of this plan. Generally, forests above 2,000 feet contour are kept out of grazing … … … … … … … … … 564

Areas to be closed to grazing on silvicultural grounds are stated … 565

The District Forest Officer may close to grazing if any forest is wantonly burnt … … … … … … … … 566

Grazing notification to be published in May … … … 567

Grazing will be regulated by grazing permits. Grazing year is the fasli year … … … … … … … … … 568 to 570

Penning of cattle inside will be encouraged by making it free. A licence is however required … … … … … … 571

	PARAGRAPHS
Fodder grass can be removed from forest free of charge under certain conditions	572
Kanis can be allowed free grazing of their own cattle	573
There is no limit to the number of cattle that should graze or be penned. Every convenience should be given to the public in the matter of selling permits	574
Sandalwood.—Sandal trees of above 3 inches in girth in the regeneration areas will be extracted by the department. These trees will also be disposed of in the same manner as provided for in the sandalwood working circle yield figures should be posted in the control form given for sandalwood working circle	576 to 579
Gluta Travancorica Plantation.—Near Kannikatty rest house there is a plantation of *gluta* raised in 1914. Probably it is the oldest plantation in the country. It should be handed over to the State Silviculturist to make it a preservation of sample plot	580 and 581
Preservation of wild life.—Big game was formerly abundant on the Mundanthorai plateau, but now it has dwindled. The opening of a checking station at Papanasam is a good beginning. It should be manned by a full time guard and watcher to be effective	582
The Mundanthorai plateau may be constituted into a game sanctuary. Nilgai, Blackbuck, Bison and Pea fowl may be introduced in suitable places of the division	583
Fire Protection.—Fires are caused mostly by graziers. Outer slopes below 2,000 feet get burnt from February to June	584
Areas wantonly burnt should be closed to grazing. Minor Forest Produce contractors who burn forests to collect gall nuts will be find heavily	585 and 586
Fires should be put out by staff as soon as detected irrespective of time. Every attempt should be made to trace the cause of the fire.	587
Existing fire lines and boundaries will be maintained. All roads and paths will be cleared and fire-traced. A list of boundaries, roads, etc., to be fire-traced annually and their length are given	588
Fire patrols may be employed annually for three months from February to April	589
Fire maps will be maintained separately for each range	590
Roads.—All roads to be maintained in good condition. During fire season they should be kept clear of inflammable materials	591
List of roads and paths to be maintained every year is given ...	592
Roads to be metalled are mentioned	593
Bridle path in evergreen forest has to be repaired	594
A road should be formed for Pattavarayankoil forest teak plantations	595
Buildings.—Surroundings of buildings will be kept clean of undergrowth	596
Sanitary arrangements to the range inspection shed and electricity to the subordinates' line in Kuttalam may be provided	597
Quarters for subordinates of Sivagiri section and those engaged in planting matchwood are suggested. The Forest Guards' line at Mundanthorai has to be rebuilt	598
If the Ambasamudram Range quarters are taken away, a new one may be built at lower camp	599
Quarters and office for Sankarankoil range to be constructed ...	600
Flooring of staff quarters to be improved	601
Sivasailam rest house to be repaired. The rest house at Puliyara may be given to the subordinates	602

	PARAGRAPHS.
Boundaries.—The inter-state boundary needs no maintenance ...	603
Reserved boundaries to be maintained properly. Missing cairns should be constructed again	604
The ex-estate forests and reserved lands to be notified under section 26 of the Forest Act in due course	605
Boundary of Puliyara reserve is imperfect and needs demarcation.	606
Cardamom estates in Sivagiri forest should be surveyed and demarcated after the settlement officer pronounces judgment	607
Miscellaneous Teak Plantations.—The two poor teak plantations will be felled and planted with *Eucalyptus*	608
Inspection paths in plantations.—Plantations of more 50 acres in extent to have inspection paths running diagonal to the plantation ...	609
Cardamom leases.—Arrangements for leasing out the areas will be made in accordance with the instructions in force	610
Faggot wood removal.—The removal of free firewood will be allowed on permit in areas where the system was prevailing	611
Control journal.—Control journal should not be filled up with statistics contained in control forms. It should contain useful comments and observations	612
Control forms.—Sample forms are given in the appendix. A copy of the forms filled up should be submitted annually to the Conservator.	613

Chapter XI—Establishment and labour.

Establishment.—An additional forester and guard are required for the teak planting programme	614
A boatman is necessary at Mundanthorai	615
Some beats in Shencottah Range have two guards each. A re-allocation of guards and watchers is suggested	616 to 619
Survey and demarcation of the cardamom estates in Sivagiri forests will require special staff	620
An Assistant Range Officer to Ambasamudram range is suggested.	621
It is suggested that the post of lease clerk be upgraded to that of an Upper Division Clerk. One additional Lower Division Clerk to the District Forest Office is suggested	622 and 623
Labour.—There is some labour difficulty in Sivagiri area only.	

Chapter XII—Financial Forecast and cost of the working plan.

Forest.—An annual surplus of about 3.2 lakhs of rupees is expected for the division during the working period	626 and 627
Cost of the working plan.—The cost of the working plan is Rs. 54,032.95. One working plan officer, two rangers, five foresters, one clerk and four peons were employed for the working plan division, which was formed on 15th November 1958 and closed on 15th September 1960	628 to 630

APPENDIX I.

Annual Rainfall Statement—Tirunelveli North Division.

Name of Station. (1)	Annual rainfall in inches. 1949. (2)	1950. (3)	1951. (4)	1952. (5)	1953. (6)	1954. (7)	1955. (8)	1956. (9)	1957. (10)	1958. (11)	Average. (12)
Sivagiri	20·75	26·35	40·65	23·60	36·78	36·54	27·12	23·90	26·80	31·71	29·42
Kadayanallur	19·71	32·63	49·60	31·14	31·12	39·99	36·73	15·84	14·00	38·96	32·57
Shencottah	..	..	..	..	..	56·89	51·27	32·67	52·71	53·12	49·69
Kuttalam	36·40	45·40	55·60	31·10	51·70	69·90	42·00	35·40	56·00	..	47·17
Thirthakarai	..	..	..	..	..	..	..	5·00	27·03	62·75	31·58
Kuduparai	..	..	..	..	..	..	..	22·30	79·90	56·45	52·88
Kuttalam-Kalluruvi	..	..	..	..	..	..	..	..	126·20	76·08	101·14
Valayar	136·05	187·40	175·25	161·35	181·30	217·10	200·00	159·15	180·55	175.40	177·35
Martin's Hutt	110·23	156·32	155·45	125·58	153·31	171.72	151·17	116·82	146·82	124·95	141·94
Kannikatty	167·30	184·90	170·90	124·30	152·85	186·40	154·50	121·95	157·05	134·70	155·46
Upper Dam	58·09	65·61	81·47	60·39	72·16	82·56	81·31	49·62	74·31	62·08	69·06
Mundanthorai	..	..	..	..	..	55·60	52·43	31·94	37·51	53·04	46·10
Lower Dam	30·26	38·80	53·49	40·74	41·07	58·10	41·36	29·98	36·30	40·89	41·10
Ambasamudram	23·17	39·15	38·28	20·90	40·01	38·21	34·67	22·38	33·32	31·56	21·17

NOTE.—Records for Kuttalam, Thirthakarai, Kuduparai, Kuttalam, Kalluruvi and Mundanthorai are not reliable.

APPENDIX II.

List of patta lands and revenue porambokes as they now exist in Puliyara reserved forest.

I. Shencottah village.

Survey number. (1)	Nature of enclosure. (2)	Extent. (3)
		ACRES.
560	Patta	144·85
561	Do.	6·56
562/1	Do.	20·50
562/2	Do.	4·90
523	Do.	13·15
564/1	Do.	10·45
564/2	Do.	6·15
565	Do.	8·20
566	Do.	34·55
567	Do.	3·06
568	Do.	7·15
570	Do.	44·05
523/1A	Do.	13·76
523/1B	Waste	50·60
523/2	Do.	152·26
524/1A and B	Patta	163·47
524/1C	Waste	139·15
525/2 and 1	Patta	11·92
526/1	Waste	45·48
527/1A and B	Patta	3·20
527/1C	Waste	8·47
527/2A	Patta	0·80
527/2B	Waste	3·00
527/3A	Patta	0·30
527/3B	Waste	4·50
527/4A	Patta	1·15
527/4B	Waste	2·35
527/5	Patta	5·45
528/1A	Do.	30·30
528/1B	Waste	22·75
528/2A	Patta	16·38
528/2B	Waste	17·02
541/2C	Patta	1·25
541/3	Do.	3·22
541/4A	Do.	0·96
541/4B	Waste	1·56
541/5	Patta	4·80
541/6A	Do.	0·75
541/6B	Do.	3·52
542/1	Do.	0·97
543/1	Do.	6·16
544/1	Do.	3·94
545/1	Do.	2·84
546/1	Do.	4·92
547/1	Do.	47·60
548/1	Do.	16·05
548/2	Do.	7·55
548/3	Do.	8·70
549/A	Do.	1·55
549/B	Waste	17·50
550/1	Patta	13·75
551/1A	Do.	0·40
551/1B	Do.	2·35
551/1C	Waste	3·85
552/1A	Patta	0·56
552/1B	Waste	2·45
553	Patta	1·62
554/1A	Do.	0·90
554/1B	Do.	7·92
554/1C	Do.	1·55
554/1D	Do.	10·60
554/1E	Do.	0.70
554/1F	Do.	30·00
554/1G	Do.	3·13
554/2A	Do.	1·11
554/2B	Waste	1·12
555/1A	Patta	2·00
2	Do.	43·52
294	Do.	5·71
295/1A1	Do.	10·20
295/1A2	Do.	35·00
295/1B	Waste	163·25
296/1A	Patta	65·00

(This was added to R.F. in M.E. 4th October 1883.)

Survey number. (1)	Nature of enclosure. (2)	Extent. (3)
		ACRES.
528/3	Patta	11·54
529/1	Do.	1·65
529/2A	Do.	0·90
529/2B	Waste	19·09
529/3A	Patta	0·90
529/3B	Do.	10·80
529/4A	Do.	2·00
529/4B	Waste	0·60
530/1A	Patta	3·05
530/1B	Do.	26·02
530/1C	Do.	20·25
530/1D	Do.	68·73
532	Odai poramboke.	18·08
533/A	Patta	3.85
533/B	Do.	10·30
534/A and B	Patta	40·35
535/1A	Do.	1·70
535/1B	Waste	22·50
536/1A	Patta	4·16
536/1B	Waste	6·90
537/1	Patta	40·56
538/1 A and B	Do.	21·20
539/A	Do.	10·00
439/B	Waste	24·50
539/2	Patta	2·74
540/1A	Do.	1·70
540/1B	Waste	1·33
540/2A	Patta	1·20
540/2B	Waste	0·93
541/1	Patta	0·79
541/2A	Do.	1·24
541/2B	Do.	2·75
555/1B	Waste	1·65
555/2	Patta	2·39
550/1A	Do.	3·12
556/1B	Waste	17·57
557/1	Patta	3·59
557/2	Do.	5·10
558	Do.	11·99
576	Do.	149·24
577	Gone to Kerala	
578	Do.	
579	Waste	128 00
296/1B	These Survey.	108·15
297	Nos. were	35·27
298/1/18	once patta	5·67
299/1B	lands, but	210·69
302/18	subsequently	37·02
302/2B	added	65·22
302/3	on to the	6·56
302/4	Puliyara	1·75
303/1B	Reserved	26·15
303/2B	Forest	100·82
304/1		6·76

II. Puliyara village.

Survey number. (1)	Nature of enclosure. (2)	Extent. (3)
2	Patta	43·52
..	..	..
..	..	..
..	..	..
..	..	..
..	..	..
..	..	..
..	..	..
..	..	..
331/4C	Waste	7·15
332	Patta	12·72
332/2	Do.	10·47
332/2	Do.	4·07
333/1A	Do.	38·12
333/1B	Do.	11·06

APPENDIX II—*cont.*

List of patta lands and revenue parambokes as they now exist in Puliyara Reserved forest—cont.

Serial number. (1)	Nature of enclosere. (2)	Extent acres. (3)
II. PULINUR VILLAGE— *cont.*		
299/1A	Patta	75·00
299/2	Waste	3.20
300/1A	Patta	5·32
300/1B	Waste	67·88
300/2	Do.	10·84
300/1A	Patta	10·00
301/1B	Waste	13·62
302/1A	Patta	6.00
302/2A	Do.	3·00
303/A	Do.	3·50
303/2A1	Do.	13·13
803/2A2	Do.	5·00
303/3	Railway	4·20
303/4	Road	12·09
305/1A	Patta	21·00
305/1B (out of 70·75 acres the balance has gone to Kerala.)	Waste	54·43
331/3A	Patta	3·06
331/3B	Do.	2·00
331/4A	Do.	1·56
331/4B	Do.	4·50
III. MEKKARAI VILLAGE.		
140/1	Patta	23·85
141/1	Do.	22·94
142/1	Do.	8·26
143/1	Do.	29·74
144/1	Do.	1·20
144/1B	Do.	17·80
145/1	Do.	[illegible]·90
145/2	Do.	3·80
145/3	Do.	6·40
146/1	Do.	3·59
146/2	Do.	8·47
146/3	Do.	8·40
147/1	Do.	9·36
IV. MEKKARAI VILLAGE.		
3/1	Waste	12·75
3/2	Do.	3·80
3/3	Do.	16·50
3/4	Do.	2·25
3/5	Do.	0·30
4/1	Do.	1·37
5/1	Do.	3·52
6/1	Do.	2·50
6/2	Do.	5·67
7/1	Waste	45·89
7/7	Do.	
8/1	Do.	20·05
9/1	Do.	12·04
10/1 to 10/7	Do.	14·80
11/1 and 2	Do.	8·24
11/2	Do.	7·47
13/1 and 2	Do.	45·94
14/1 to 3	Patta	381·90
15/1 and 2	Do.	284·41
16/A	Do.	14.00
16/1 to 3	Do.	9·55
17/A	Do.	167·07
17/B	Do.	578·88
18/A	Do.	0·30
18/B1	Do.	6·00
18/B2	Do.	5·12

APPENDIX III.

Tirunelveli North Division—Rights and privileges admitted in the Reserved forests.

1. *Papanasam Reserved Forests Upper Slopes.*—(Papanasam-Alwarkurichi Ghat Forests) Upper Slopes.

(*a*) Public right of way over the road leading from the Papanasam temple to Travancore. Its length through the forest is 4½ miles and breadth 12 feet, open for men, cattle and vehicles generally including motor vehicles, subject to the condition that no motor vehicle shall be driven over the road after sunset, and before sunrise, unless permission in that behalf has been previously obtained in writing from the District Forest Officer.

[G.O. No. 899 (Development), page 814, *Fort St. George Gazette*, dated 9th June 1936.]

Right of way—The following rights of way are allowed:—

(1) To Kuttalaimalai and Pamban-Arudi (via) Kullitapulli and Banatirtam.

(2) To Travancore territory (Mackinnous Valley) (via) Banatirtam and the new trace through the Shembar Valley to Kuliramantapam known as Bourdillons trace.

(3) To the Ponmudi Coffee Estate in Travancore (via) the bridle path passing through Kullitapuli and Kattamalai with a branch near Kalavelipillu Teri to the Athermalai estate in Travancore.

(4) To Travancore by the Ayankoil pass (via) Sivarama Mudaliar Coffee Estates.

II. *Papanasam Reserved Forest—Lower Slopes II b.*—(Papanasam–Alwarkurichy) Lower Slopes II *b*.

(*a*) Public right of way over the road leading from the Papanasam temple to Travancore—*vide* item (*a*) in Papanasam Upper Slopes above.

APPENDIX III—*cont.*

The following enclosures within the forest will be alowed reasonable means of access, viz:—

(*a*) Koraiyar, (*b*) Agastiarkoil, (*c*) Kottantalam, (*e*) Kilapanimamuduku, (*k*) Tripanipuram, (*l*) Kolakanathankoil, (*m*) Kariyan Odai and the patta trees on the south bank of Koraiar and (*g*) in favour of Messrs. A. & F. Harvey to take water from the Tamparavarni river above the Papanasam falls to the spinning mills situated at the foot of the Aladiur hill by a channel constructed and maintained by the claimants for a distance of about seven furlongs through the forest, subject to condition.

Right to the public to use the temples and shrines—(1) *Kannimaraman Koil.*—By a footpath, six feet wide, entering the Reserved Forest in Kadayamperumpattu village between pillars 30 and 31, at a point 108 links east of the former going in a west-south-westerly direction for about 4½ chains and entering the enclosure on its eastern side about 12 links from north-east corner. For men only during day-time, fires may be lighted for cooking during the day only on the following festivals:—

(1) Chitrai Vishu, (2) Panguni Uttiram and (3) Masi Tirunal.

(2) *Kotharipallivasal.*—By a footpath six feet wide branching from the Sivasailam road at a point 137 links from the first furlong to the 2 mile going in a westerly direction for about 1½ chains and entering the enclosure on its southern side just six links west of its south-east corner. It leaves the enclosure on it's north-eastern side at a point seven links west of its north-east corner, then going in a south-west direction for about 3¼ chains and entering the Kolakkanathar koil, already admitted enclosure on its north side.

For men only during day-time, the lamps in the enclosure may be lit during day-times on the following Mohammadan festivals, (1) Ramzan, (2) Bakrid, (3) Saffar and (4) Kandiri. No other fires are allowed.

Kaliyanathirtham bathing place.—The situation is that of the Papanasam falls in the Tamparavarni river about 24 chains from the Agastiyar temple. An area of 1·88 acres comprising the falls and pool is allowed to be used. It contains no buildings but there are images cut on the rocks. The right is for men only and the place may be visited by day-light alone. Access is by a path 6 feet wide in continuation of that to the Agastiyar temple passing along the margin of the left bank of the river.

Right of public to use the following temples:—(i) Access will be allowed for men only during day-time by a path six feet wide; (ii) no bill-hooks or other cutting instruments are to be taken along the path; (iii) fires may be lighted in enclosures Nos. 4 and 5 but if the privilege is abused, the Government reserve to themselves the right to withdraw it. This concession does not include the right to take firewood from the reserved forests; (iv) no new buildings may be erected in the enclosures without the Collector's permission.

Name of shrine and extent. (1)	*Beat and location.* (2)	*Access.* (3)	*Remarks.* (4)
1. Korayakulam Sastha Koil (less than one cent).	Aladiyur Reserve ..	By a path starting from a point in the boundary between pillars 39 and 40 about one hundred and twenty links north of the latter, going in a westerly direction for about a chain and entering the east side of the temple.	No fires allowed.
2. Kallatrukadavoo Sasthakoil (less than one cent).	Do. ..	By a path starting from a point on the line between pillars 67 and 68 of the Tripanipuram enclosure about 74 links north of pillar No. 68 going in a south-westerly direction for about 375 links and entering the enclosure at its north east corner.	Do.
3. Kallatrukadavoo Pattarayan Koil (3½ cents).	South-West of temple No. 2.	By a path starting from north-west corner of temple No. 2 above, going in a south-westerly direction for about 218 links and entering the enclosure on its east side.	Do.
4. Vellaparai Pattarayan-koil.	Aladiyur Beat ..	By a path starting from a point on the Tripanipuram enclosure boundary line at about 177 links east of Pillar No. 2 going in a south-westerly direction for about 100 chains and entering the enclosure on its south-east side Then it leaves it on its south-west side in a south-westerly direction for about 16 chains and leaves the Reserve Foroest boundary on the Singampatti fire line at Pillar No. 4.	Fires allowed on (1) Panguni Uttaram,—3 days; (2) Adi-Ammavasai—7 days.

APPENDIX III—*cont.*

Name of shrine and extent.	*Beat and location.*	*Acces.*	*Remarks.*
(1)	(2)	(3)	(4)
5. Vellapari Sastha koil (6 cents).	About 280 links north east of temple No. 4	By a path starting at the northern most point of temple No. 4 going in a north-westerly direction and entering the enclosure south of its north east corner. Total length 286 links.	Fires allowed on (1) Panguni Uttaram—3 days ; (2) Adi Ammavasai—7 days.
6. Singaraja Sastha Koil (about 5 cents).	Koraiar beat ..	The path starts from a point on the Reserve Forest boundary about 50 links north of forest Pillar No. 13 going in a westerly direction for about half the length and thence in a north-westerly direction. Total length 16·50 chains.	Access only (1) Panguni Uttiram, (2) Karthigaitheepam, (3) Chitravisu, firest may be lighted.
7. Singaraja Pattarayan Koil (about 3 cents).	In the same locality about 9 chains from Reserve Forest boundary.	Follows the above path for about 8 chains, then branches southwards for 80 links.	Fires allowed on (1) Panguni Uttaram—3 days ; (2) Adi Ammavasi—7 days.
8. Nithampoliyam Pattarayan (about 2 cents).	Koraiar beat 85 links south-west of Cairn No. 60.	The path starts from a point in the Reserve Forest boundary about 75 links south-west of Pillar No. 61 and goes in a north-westerly direction for about 6½ chains.	The lighting of fires is not allowed.
9. Nithampoliyam Sastha-Koil (about 3 cents).	Koraiar beat 85 links south of above temple north-west of Pillar No. 61.	By the above path for a distance of 290 links from the reserve boundary thence in a westerly direction for 187 links.	Fires may be lighted on (1) Panguni Uttiram, (2) Adi Amavasai, (3) Chitravisu (4) Karthigai theepam.
10. India Sasthakoil (about 10 cents).	Koraiar beat between Pillar Nos. 92 and 93.	Adjoins Reserve Forest Boundary.	Fires not allowed.
11. Thalaiyanisundalai Madaswami koil (about 2 cents).	On the Reserve Forest boundary between Pillar Nos. 100 and 101.	The path follows the right bank of the P.W.D. Channel. (Kodamelalagiankal).	Do.
12. Thalaiyani Ammankoil.	South of Pillar No. 101.	The path enters the reserve boundary between pillars 100 and 101 from a point 57 links west of the latter and runs in a southerly direction for about 8 chains.	Do.

Concession order to V. N. Sankarapapanasam Pillai, pattadar No. 2 of Vikramasingapuram village:—

To clear within Reserved Forest limits the channel which branches from the Cheppar stream near cairn No. 71 and leaves the Reserved Forest between pillar Nos. 81 and 82 whenever required and to make a permanent masonry through to carry the channel over the northern one of the two odaies which cross the Reserved Forest boundary between pillars Nos. 81 and 82 partly within and partly without the said portion of the Reserved Forest boundary and to keep it in repairs, subject to condition.

Right of way.—A way for men and animals 9 feet broad entering the Reserved Forests boundary between forest pillars Nos. 1 and 2 of the Sivasailam beat, and going in a westerly direction as for the cairns line dividing the upper and lower slopes and then joining the right of way through the upper slopes reserved forest. This way will follow the forest roads as for the first furlong stone after the second mile stone and then the old path.

Sivarama Mudaliar Estate.—Permission is granted to Anthonimuthu Upadasiar to improve the path running from the reserved forest line to Sivarama Mudaliar's estate as far as Thirthakarai.

III. *Kuttalam Reserve.*

The following rights of way are allowed:—

(1) To Kuliratti Coffee Estate by the valley of the Aluthakannirar.

(2) To the Shenbagadevi Koil by the second fall above Courtallam.

(3) To the spice garden and coffee estate by the left bank of Chittar with a branch to the Thirukuttala Parvadam estate.

(4) To the Coffee Estate above Ramakkal Teri branching off from the five falls road.

(5) To the Onjilkatti Coffee Estate from the Vallam village.

(6) To the Nellioothu Coffee Estate by the Nellioothuodai valley with branch roads to the Alalkondal and Shairmalai estates.

(7) To the Kottamalai Coffee Estate by the Gondar valley.

APPENDIX III—*cont.*

(8) Footpath to Chinnaramakkal Coffee Estate 9 feet wide and open for people and cattle. It enters the south-east corner of S. No. 1208 of Illanji village and runs south into Kuttalam Reserved Forest.

(9) Footpath to Periya Ramakkal Coffee Estate 9 feet wide open for people and cattle.

(10) Right of the villagers to clear the supply channel entering at cairn No. 165.

(11) Right of the villagers to clear the supply channel entering at cairn No. 11.

(12) Right of the villagers to clear the supply channel entering at cairn No. 10. The above three rights are subject to the previous permission of the Forest authorities.

The undermentioned rights of way are admitted:—

Footpath to Kanniaarammankoil and Kuliratti coffee estate in the Kuttalam Reserved Forest two yards wide and open for people. It enters the block near stone No. 48 and runs west into the aforesaid reserve.

2. Permision to clear the following channels is also granted with the block on behalf of the villagers of Melegaram on condition that previous notice is given to the Forest Department:—

(1) The Tenkal channel enters the reserve at a point seventeen chains south of the north-west corner of the reserve and running for a distance of twenty-five chains leaves it near cairn No. 93.

(2) The Vadakkal channel enters the reserve twenty-three chains south of the north-west corner of the reserve after running for a distance of four chains leaves it near cairn No. 91.

(3) The Kattakudikal channel enters the reserve at a point eight chains south-west of the most westerly point of Survey No. 592 (inside reserve) and after running for a distance of thirty chains leaves it one chain south of the north.

(4) The Shanankulamkal channel enters within the reserve at a point 38 chains south of cairn No. 75 after running for a distance of 24 chains leaves the reserve at a point five chains south-east of cairn No. 68.

(5) To Shembadevikal channel enters the reserve at a point forty-three chains south of cairn No. 75 and leaves the reserve at a point six chains north-west of cairn No. 67 after running for a distance of thirty chains.

Shrine or temple.	*Situation.*	*Access.*	*Remarks.*
(1)	(2)	(3)	(4)
Kannimarkoil	It is situated on the right of way to Kaliratti estate near the place on the Aladakannir from which a channel takes off to supply the tanks in Ayiraperi village. N. Buildings. It is near right bank of the river.	By the right of way leading to the Kuliratte estate entering the reserved forest at 20 links north of pillar No. 49.	Available for men only during day time throughout the year. No fires may be lighted.
Palayakuttalam temple ..	Situated near the bank of said Aludanniar between the channel above referred to and the river.	Do.	Available for men only during day time throughout the year. No fires may be lighted. A ruined platform.
Shenbagadevikoil	Situated on the right bank of the Chittar below the first large waterfall above the Kuttalam falls.	Along the Terkumalai bridle path and branch to the temple.	May be used at any time of the year. Fires may be lighted inside the demarcated area.
Five Falls Ayanar Koil ..	At the end of the five falls road leading from Kuttalam and maintained by the Forest Department below the Five Falls-Tamil 'Ainthalarvi'-and between the water sources known as 'Ainthalaruvi river' and Illanjikal.	By the five falls road crossing the reserve boundary between pillars 159 and 160.	Do.

The following rights are admitted in favour of the public:—

(A) Right of way over bridle path from Kuttalam to Shenbagadevi stream and temple, open to the general public to a width of 18 links. It enters the reserve on its north boundary at a point 21 links west of the north-east corner of the reserve, runs in a south-westerly direction for a distance of 744 links and leaves the reserve no its south boundary at a point 82 links south-east of cairn No. 114 of Kuttalam Reserve Forest.

(B) (i) The right to the use of the bathing ghat 20 links square with a masonry wall on its east and a flight of steps on the northern end. It lies across the Chittaruvi (stream) where it leaves the northern boundary of the reserve, at a point 587 links east of its north-west corner.

(ii) The right to the use of the stream 'Chittaruvi' for irrigation, drinking and bathing purpose as well as the right to clear it. It enters the reserve on its southern boundary at point 30 links west of cairn No. 114 of Kuttalam Reserve, runs northwards and leaves the reserve on its north boundary at a point 587 links east of the north-west corner.

APPENDIX III—*cont.*

Permission is granted to the Public Works Department to get cleared all vegetation and roots which affect the masonry of the Thalai Ani Anaicut, in Kuttalam Reserve Forest for about six feet on either side.

Permission is granted to Sri Abbas Ali to lay out a motorable road within the Kuttalam Reserved Forest for a width of 20 feet to Terkumalai and Paradesipudai estate situated in Kuttalam Reserve Forest. The road will be vested in the Forest Department. The Chief Conservator of Forests considers that there is no need to admit a right of way to the 'Honey Falls' as it is only a scenery rarely visited by the public. But no objection should be taken to visitors going to see the falls.

Permission is granted to the Managing Director, Sri Meenakshi Mills, Limited, Madurai, to carry out improvements to the Sasthankoil temple and Mantapam along with improvements to the upper and lower falls, situated inside Kuttalam Reserve Forest under condition specified.

IV. *Vadagarai-Melpidagai.*

Admitted rights—Nil.

V. *Kadayanallur Reserve Forest—Chinnakadu Hill.*

1. Public right of way 85 yards long and one yard broad is admitted from Cairn No. 1 at the southern boundary of the block to a temple called 'Kanimarkoil'. It is open for people only.

2. The temple called Kannimarkoil, its site and the space around it used by worshippers the whole measuring 25 yards by $16\frac{2}{3}$ yards is excluded from reservation and will be an enclosure to be approached by public right of Way No. 1.

VI. *Vadagarai-Kilpidagai.*

Right to the public to use the temple noted below:—(1) The worshippers shall plant stone pillars 3 feet above the ground-level at each of the temple enclosures. (2) They may plant trees within the enclosures to give shade but no trees should be cut. (3) The dead and wind fallen trees belong to Government. (4) Fires may be lighted within the enclosures for COOKING FOOD. (5) Access is allowed throughout the year during day-light for men only. (6) The use of the Budathar temple at night is allowed on the occasion of the annual festival for which 15 days' notice should be given to Range Office at Kadayanallur.

Shrine. (1)	*Situation.* (2)	*Access (for men only).* (3)
1 Karuppaswamy koil in Vadagarai Kilpidagai.	About $33\frac{1}{2}$ chains north of pillar No. 49.	From the Adiyanayanur koil in Travancore.
2 Budata temple in Kadayanallur Rural Forest (about 50 cents).	It lies in coupe No. XI of Kadayanallur W.C.	A right of way about two chains in length of six feet wide from the third furlong stone of the second mile from the forest road in a north-easterly direction.

VII. *Krishnapuram Reserve Forest.*

Rights of entry on behalf of the villagers of Krishnapuram for the purpose of clearing the supply channel running inside close to the western boundary of the block provided the previous permission of the Forest Department is obtained.

VIII. *Puliangudi–Chintamoni–Vasudevanallur.*

Rights to the public to use the following temples:—

(1) No fires should be lighted in any of the temples.

(2) Access is to be allowed only for men and in day-light only.

Serial number and name of shrine. (1)	*Location.* (2)	*Access.* (3)	*Remarks.* (4)
1 Savarimalayan koil ..	On the northern side of the forest road from Vasudevanallur to Kottanterri and north-west of Karuppannasamikoil working circle fire line.	By the forest road from Vasudevanallur to Kottanteri inside Rural Forest.	Once a year.
2 Kannimar koil ..	Stone image in coupe No. III. Aq. Karupswamy koil working circle.	By a foot-path west words crossing the Rural Forest boundary near pillar No. 40.	On wednesdays and Saturdays.
3 Rakkammal koil ..	On the southern side of the Virisadikidai river about four chans north of pillar No. 86.	By a foot-path passing north wards from between pillars Nos. 86 and 86.	Once a year.

APPENDIX III—*cont.*

Serial number and name of shrine. (1)	*Location.* (2)	*Access.* (3)	*Remarks.* (4)
4 Kanimar koil	On the northern side of the Virasadikidai river about twenty-four chains west of the cairns line dividing Rural Forest IV and IV-A.	By a foot-path passing west wards entering the Rural Forest between pillars 98 and 99.	Once a year.

In the case of following temples, the worshippers should plant stone pillars 4 feet long so that 3 feet of the above stone shows above the ground-level at each and every corner of the temples. The worshippers may plant trees but should not cut any trees. The right to use or sell any dead and fallen trees vests with the Government.

Serial number and name of shrine. (1)	*Location.* (2)	*Access.* (3)	*Remarks.* (4)
1 Periakaruppaswamy koil about 0·306 acres.	Situated on the right bank of the Kottamalai river when it divides into two channels.	By a path passing the dismantled Karuppaswamy koil rest house. It entres the Rural Forest about eighty links north of Pillar No. 4 and proceeds thence to the temple crossing the river and leading to the temple on the southern side width ten feet length approximately one mile.	Every Wednesday and Saturday.
2 Chinnakaruppaswamy koil (about 0·018 acres).	Situated in coupe No. XIX of Karuppaswamy koil working circle.	By the above path for about 478 links from the reserve boundary and thence south along a path ten feet wide to the temple.	Do.

Note.—For men with or without animals taken for sacrifice, the carrying of naked lights is forbidden. Cooking is allowed in Periakaruppaswamy Koil enclosure.

The following rights of way are admitted:—

The path from Vasudevanallur to Adiramalagi Iyenkoil passing by Valaivithi and thence to the crossing of the Talayanaiar or Palaiyar river immediately above Kulasegaraperi anicut, enters the forest at Survey Field No. 263 of Thirumalpuram village and leaves it just above the anicut. Its length is 120 yards and breadth 9 feet, open for people only.

The following rights to water are admitted:—

(1) In favour of the Zamindar of Sivagiri right to the water of two natural streams skirting the north and south base of Munjimalai hill and flowing naturally into the Pudukulam tank of Kottaiyar village without prejudice to what may naturally flow into other channels.

In favour of the ryots of Tirumalapuram, Naranapuram and Vasudevanallur village the right to the use of water from the Kulasagaraperi channel supplied by the Palaiyar alias Talaiyanaiar, and to enter upon clear and repair the channel when necessary.

The rights to the Samudayan patta usufruct over 696 trees in the limits or Naranapuram village and 474 in the limits of Vasudevanallur village, total 1,170 is admitted in favour of the said villagers subject to any rules that the Government may pass under section 12 (*a*) of the Forest Act and provided (1) that the rights shall not be alienated by way of grant, sale, lease, mortgage or otherwise without the sanction of the Government; and (2) that no access shall be had to the trees without the permission of the Forest Officer not below the rank of Forester, except during the months of January to June both inclusive. The produce obtained may be sold or bartered.

Chintamani Block A—Rights of way.—Cart-track from Chintamani to Karuppanaswamikoil (outside the block) six yards wide and open to people, cattle and carts. It enters the block at Cair No. 19 at the north-west corner of S. No. 585 and running south-west and south leaves the block at its south-east corner. It again enters the block at its south-west corner and running along the block boundary leaves it at about one chain south of Cair No. 66. Sri Paul Rama Iyyer, son of Sundaram Iyyar (Pattadar No. 28), Vasudevanallur is granted permission to clear the growth on the channel leading to Pulayankulam running within Vasudevanallur Reserve Forest. (Permission restricted to one year.)

IX. *Kottamalai Reserved Forest (ex-Panchayat)—Admitted rights of way.*—Cart-track available for men, cattle and carts 15 feet wide entering the reserve fifty links south-west of the central survey stone on the southern side of S. No. 365 and leaving it 580 links north by east of the south-west corner of S. No. 364. The cart-track re-enters the reserve 15 links east of the north-west corner of S. No. 364 and leaves finally at a point 120 links west by north of the north-west corner of S. No. 363.

APPENDIX IV.

A.—*List of Cardamom estates in Sivagiri Ex-zamin Forests.*

Serial number and name of occupants. (1)	*Tentative area in acres.* (2)
1 Sri A.K.D. Alagar Rajah	274·00
2 Sri M.P.V. Ayyanar Rajah	51·00
3 Sri P.S. Subbarajah	85·84
4 Sri S.S.A. Sankar Rajah	
5 Srimathi P.C. Gomathi Ammal	63·16
6 Sri P.S. Alagar Rajah	110·00
7 Sri A. Palaniswamy Thevar	99·00
8 Sri Ramachandra Thevar	
9 Sri Ponnuswamy Thevar	
Total	683·00

B.—*List of Cardamom leases inside Reserved forests.*

Serial number and name of lessee. (1)	*Block.* (2)	*Area in acres.* (3)	*Range.* (4)
1 Sri M.V.S. Kadirvel Nadar	2	50	Ambasamudram.
2 Do.	3	50	Do.
3 Do.	6	50	Do.
4 Do.	10	40	Do.
5 Do.	15	40	Do.
6 Do.	16	40	Do.
7 Do.	17	40	Do.
8 Do.	19	50	Do.
9 Do.	20	50	Do.
10 Sri G. Subramania Iyer	1	50	Do.
11 Sri S.S. Rajalinga Rajah	4	50	Do.
12 Sri M.V.S. Ratnavel Nadar	5	50	Do.
13 Do.	9	40	Do.
14 Do.	14	40	Do.
15 Do.	23	30	Do.
16 Sri K.V. Mani	7	50	Do.
17 Do.	11	50	Do.
18 Do.	21	40	Do.
19 Kalanjiam Devasagayam	8	50	Do.
20 Do.	12	40	Do.
21 Sri M.V. Chacko	..	72	Kuttalam.
22 Sri A. Karrok	..	42	Do.
Total	..	1,014	

APPENDIX V.

List of Teak plantations in the division.

Serial number. (1)	*Year of planting.* (2)	*Locality.* (3)	*Area in acres.* (4)	*Age in 1959.* (5)	*Girth in inches.* (6)	*Mean height in feet.* (7)	*Quality class.* (8)
1	1917	Servaiar	2·30	42	36	53	IV
2	1922	Do.	32·00	37	24	39	Below IV
3	1923	Do.	29·00	36	28	44	IV
4	1924	Do.	25·00	35	27	47	IV
5	1932	Do.	6·50	27	19	28	Below IV
6	1933	Do.	8·15	26	18	30	Below IV
7	1936	Do.	17·50	23	22	39	III
8	1938	Do.	20·00	21	20	27	Below IV
9	1939	Do.	20·00	20	23	30	IV
10	1940	Do.	20·00	19	19	29	IV
11	1941	Do.	21·30	18	28	42	III
12	1942	Do.	22·50	77	21	35	IV
13	1943	Do.	21·40	16	20	35	III
14	1944	Do.	20·30	15	19	31	III
15	1945	Kariar	22·00	14	17	30	IV
16	1946	Do.	61·00	13	20	35	III
17	1947	Do.	20·00	12	17	31	III
18	1948	Do.	20·00	11	16	32	III
19	1959	Kodamadi	28·00	..	..	..	..
20	1950	Kariar	44·76	9	17	30	III
21	1931	Kuttalam	1·00	28	34	41	IV
22	1932	Do.	11·50	27	40	50	III
23	1933	Do.	12·00	26	38	45	III
24	1934	Do.	15·50	25	37	51	III
25	1935	Do.	10·00	24	36	41	IV
26	1936	Do.	10·00	23	34	42	III
27	1937	Do.	10·00	22	33	45	III
28	1938	Do.	10·00	21	31	34	IV
29	1939	Do.	10·00	20	33	43	III
30	1940	Do.	22·00	19	29	40	III

APPENDIX V—*cont.*

List of Teak plantations in the division—cont.

Serial number. (1)	*Year of planting.* (2)	*Locality.* (3)	*Area in acres.* (4)	*Age in 1952.* (5)	*Girth in inches.* (6)	*Mean height in feet.* (7)	*Quality class.* (8)
31	1941	Kuttalam.	22·00	18	35	56	II
32	1942	Do.	22·00	17	34	39	III
33	1943	Do.	22·00	16	33	39	III
34	1944	Do.	12·00	15	32	38	III
35	1945	Do.	5·00	14	28	34	III
36	1946	Do.	5·00	13	23	30	IV
37	1947	Do.	5·00	12	17	27	IV
38	1948	Do.	5·00	11	18	24	IV
39	1949	Do.	15·00	10	16	18	IV
40	1950	Do.	15·00	9	16	19	IV
41	1951	Do.	22·00	8	14	18	IV
42	1952	Do.	15·00	7	..	..	..
43	1953	Do.	15·00	6	..	..	..
44	1954	Do.	15·00	5	10	14	..
45	1954	Vallam	34·00	5	..	..	..
46	1955	Pambuli	16·00	..	..	..	..
47	1956	Do.	15·00	..	..	..	..
48	1957	Do.	25·00	..	..	..	..
49	1956	Kannupuli	50·00	..	..	..	..
50	1956	Adavikadu	50·00	..		..	..
51	1957	Do.	37·00	..	..	..	..
52	1957	Vallam	78·00	..	..	..	..
53	1957	Do.	46·00	..	..	..	..
54	1959	Do.	23·00	..	..	..	..
55	1954	Koilteri	6·00	5	12	21	..
56	1955	Do.	50·00	4	4	10	..
57	1956	Krishnapuram	31·00	..	..	..	..
58	1959	V. Melpidagai	27·00	..	..	..	..
59	1959	Adavaikadu	46·00	..	..	..	..
60	1958	Kannupuli	93·50	..	..	..	..
61	1935	Ulkonam	3·00	24	36	49	III
62	1945	Neeliammankoil	6·00	14	18	20	IV
63	1960	Adavikadu	161·00	..	..	..	..
64	1960	V. Melpidagai	27·00	..	..	..	..

APPENDIX VI.

Control form—Record of Fellings in the Teak Working Circle.

Prescribed.			Done.					
Year.	Coupe number or plantation.	Area.	Year.	Coupe number or plantation.	Area.	Revenue realised.	Yield by species.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

APPENDIX VII.

Control form—Record of Fellings in the Matchwood Working Circle.

Prescribed.			Done.					
Year.	Coupe number or plantation.	Area.	Year.	Coupe number or plantation.	Area.	Revenue realised.	Yield by species.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

APPENDIX VIII.

Control form—Record of Fellings in the Fuel Working Circle—Timber-cum-Fuel Working Circle.

Prescribed.			Done.			Yield in tons.		
Year.	Series and Coupe number.	Area.	Year.	Series and Coupe number.	Area.	Timber.	Fuel.	Revenue realised.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

APPENDIX IX.

Control form—Record of Fellings in the Bamboo Working Circle.

Prescribed.		Done.				
Year.	Coupe number.	Year.	Coupe number.	Yield.	Revenue realised.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)

APPENDIX X.

Control form—Record of Thinnings in the Teak Working Circle.

Prescribed.			Done.			Yield.					
Year.	Plantation to be thinned.	Area.	Plantation thinned.	Area.	Stems removed.	Timber.	E.P.	S.P.	T.P.	Revenue realised.	Remarks.
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)	(10)	(11)	(12)

APPENDIX XI.

Control form—Record of Extraction under Sandalwood Working Circle.

			Yield.				
Year.	**Locality prescribed.**	*Locality worked.*	*Tons*	*C.W.T.*	*Lb.*	*Oz.*	*Remarks.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

APPENDIX XII.

Control form—Record of Yield in the Minor Forest Produce Working Circle.

Year.	*Name of lease unit.*	*Revenue realised.*	*Remarks.*
(1)	(2)	(3)	(4)

Note.—Yield obtained under each produce should be recorded for the division every year.

APPENDIX XIII.

Control of plantations under all working circles.

Prescribed.			Done.				
Year and working circle.	*Area.*	*Locality.*	*Area planted.*	*Locality.*	*Range.*	*Species used.*	*Remarks.*
(1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)

Note.—A surveyed sketch of each plantation drawn to the scale of 4 inches to a mile should be added to this form every year.

APPENDIX XIV.

Control form—Record of Works.

Prescribed.				Done.				
Year.	*Nature of work.*	*Coupe or plantation.*	*Area.*	*Nature of work.*	*Coupe or plantation.*	*Area.*	*Cost.*	*Remarks.*
1)	(2)	(3)	(4)	(5)	(6)	(7)	(8)	(9)

Note.—(1) Information entered in other forms need not be repeated here.

(2) Separate sheet should be used for each working circle and miscellaneous regulations.

(3) Each working circle has to be written up under three headings, namely (a) Natures prescribed, (b) Measures suggested and (c) Measures neither prescribed nor suggested, but carried out during the year.

(4) Section 44 of the Forest Department Code will be a guidance.

APPENDIX XV.

Control Journal.

1 General	Comments and suggestions on any of the working circles, with reference to general experience or problems.
2 Natural Regeneration	Observation on important species.
3 Seedlings	Notes on season to collect, sources, germinative capacity, storage, etc., for important species.
4 Nursery	Comments on quantity of seeds per standard bed with reference to size of seedlings at the time of planting special factors contributing to good stocking and size of seedlings, etc. Other notes of interest.
5 Selection of Site	Any observed indicators of good planting site or otherwise for the principal species.
6 Planting and sowing	General comments.
7 Planting season	Notes on the dates of premonsoon and monsoon showers setting in. Comments on the dates indicated in the working plan for planting.
8 Kumri	Comments on the merits or demerits of any particular crop. Special difficulties of kumridars if any.
9 Weeding and Soil working	Comments on the timing and effect.
10 Thinning	Notes on thinning cycle and intensity with reference to growth trends, Necessity to alter the thinning cycle for teak.
11 Market conditions	Notes of special interest.
12 Minor Forest Produce	Any changes necessary in the lease units or farms.
13 Roads and Buildings	Necessity of new roads and buildings.
14 Injuries	Any unusual injury to the forest or plantations by any of the agents.
15 Wild Life	Position of game preservation on the Mundanthorai plateau.
16 Climate	General remarks about the year in general.
17 Staff and labour	Notes of importance.
18 Protection	Notes on special problems of protection and forest offences.
19 Jurisdiction and Headquarters	Change in the Jurisdiction of beats, sections, range and division, change of headquarters for any of the units and necessity.
20 Miscellaneous	....

NOTE.—Observations and experiences should find a place in this journal. Figures and statistics need not be filled in here.

APPENDIX XVI.

Summary of Annual Revenue Expenditure.

Working circle.	*Revenue.*		*Expenditure.*		*Profit or loss.*	*Remarks.*
	Working plan forecast.	*Actuals.*	*Working plan forecast.*	*Actuals.*		
(1)	(2)	(3)	(4)	(5)	(6)	(7)

APPENDIX XVII.

Diviation Statement.

Serial number.	*Control form and page number.*	*Paragraph.*	*Prescription.*	*Nature of deviation.*	*Authority for deviation.*
(1)	(2)	(3)	(4)	(5)	(6)

APPENDIX XVIII.

(A) *Common flora in the division.*

Botanical name.	*Tamil name.*
Abrus precatorius	Kundumani.
Acacia concinna	Simavelvel.
Acacia ferruginea	Sayakai.
Acacia latronum	Kaka-Odai.
Acacia intsia	Indu.
Acacia leucopholea	Vel Velam.
Acacia planifrons	Odai.
Acacia pennata	Vellai-Indu.
Acacia sundra	Karungali.
Acalypha fruticosa	Chinni.
Achyranthes aspera	Naiuruvi.
Acrocarpus fraxinifolius	Malankonnai.
Actinodaphne hookeri	Thali.
Adina cordifolia	Manjaekadambu.
Aegle marmelos	Vilvam.
Agave americana	Rail kathalai.
Aglaia roxburghiana	Chokkala.
Agrostistachys longifolia	Manikulikki.
Ailanthus excelsa	Penari.
Alangium lamarckii	Alingi.
Albizzia amara	Usil.
Albizzia lebbek	Vagai.
Albizzia odoratissima	Sittilai vagai.
Albizzia procera	Velvagai.
Albizzia stipulate	Pilivagai.
Allamanda cathartica	..
Allophylus cobbe	..
Alstonia scholaris	Elilaipali.
Amoora canarana	Karagil.
Anacolosa densiflora	Kalamanikkam.
Anogeissus latifolia	Vekkali.
Antiaris toxicaria	Marauri.
Arenja wightii	..
Arenja wightii	Alampanei.
Ardisia humilis	Kurukku Ell.
Aristolochia roxburghiana	..
Artocarpus hirsuta	Aini.
Artocarpus integrifolia	Pillaw.
Asparagus racemosus	Thanuttukodi.
Atalantia monophylla	Kattu Elumichi.
Azadirachta indica	Vembu.
Baccaurea courtallensis	Thondi.
Balanocarpus utilis	Karunkongu.
Balsamodendron berryi	Mulkiluvai.
Bambusa arundinacea	Moongil.
Bassila latifolia	Iluppai.
Bauhinia malabarica	Vellathi.
Bauhinia racemosa	Athi.
Bentinckia coddapanna	Kanthapanai.
Bischofia javanica	Milachadayan, Cholavengai.
Bombax insigne	Katt Ilavam.
Bombax malabaricum	Do.
Borassus flabellifer	Panai.
Bridelia retusa	Mulvengai.
Buchanania latifolia	Saraiparappu.
Caesalpinia bonducella	Kalachi.
Calamus pseudotenuis	Pirambu.
Calamus travancoricus	Do.
Callicarpa lantan	..
Calophyllum inophyllum	Punnai.
Calophyllum trapezifolium	Chirupunnai.
Calotropis gigantea	Erukkalai.
Calycopteris floribunda	..
Canarium strictum	Karum-Kunthirigam.
Canthium didymum	Navugu.
Capparis grandiflora	Thorattai.
Capparis aphylla	Thorattai.
Caralia integerrima	Ayma, Kalkambi.
Careya arborea	.
Carissa carandus	Kilakkai.
Carissa spinarum	Sirukila.
Caryota urens	Kundalpanei.

APPENDIX XVIII—*cont.*

(*A*) *Common flora in the division*—cont.

Botanical name.	*Tamil name.*
Cassia auriculata	Avaram.
Cassia fistula	Konnai.
Cedrela toona	Santhanavembur.
Chloroxylon swietenia	Porasu, Vaimaram.
Chickraisia tabularis	Malai Vembu.
Cinnamomum iners	Lavangam.
Cinnamomum gracile	Do.
Cissus quadrangularis	Pirandai.
Cleistanthus collinus	Odugu.
Clerodendron infortunatum	Vattakanni.
Cordia myxa	Viruvu.
Cullenia excelsa	Vedi pila.
Curcuma angustifolia	Kattu Kuvai.
Curcuma longa	Manjal.
Cycas circinalis	Kodiicham.
Dalbergia latifolia	Thothagathi.
Dallergia multiflora	Viruvetti.
Dalbergia paniculata	Painganni.
Dichrostachys cinerea	Vedathalai.
Dillenia pentagyna	Naitheku.
Diosphros affinis	..
Diospyros bourdilloni	Karumthovarai
Diospyros microphylla	Chinna thovarai.
Diospyros melanoxylon	Beedi Ilai.
Dodonea viscosa	Virali.
Dysoxylum malabaricum	Vellagil.
Elaeocarpus munroii	..
Elaeocarpus serratus	Karai.
Elaeocarpus tuberculatus	Pathrach.
Elaeodendron glancum	Keeri.
Elettaria cardamomum	Elam.
Emblica officinalis	Nellikai.
Entada scandens	Thellukai.
Erythroxylon monogynum	Chempulichi.
Eugenia gardneri	Naval.
Eugenia jambolana	Do.
Eugenia ramavarma	Do.
Eupatorium spp.	..
Euphorbia antiquorum	Kalli.
Euphorbia tirucalli	Kodikalli.
Feronia elephantum	Vilam.
Ficus bengalensis	Alamaram.
Ficus hispida	Peiathi.
Ficus glomerata	Aththi.
Filiccum decipiens	Athuvari
Flacourita cataphracta	..
Fluggea leucopyrus	Veppula.
Garcinia cambogia	Kodukkapuli.
Garcinia echinocarpa	Malampunna.
Garcinia morella	Makki.
Garcinia travancorica	Do.
Gardenia gummifera	Kambili.
Givotia rottlerifornus	Vandalei.
Gloriosa superba	Kalappai kilangu.
Gluta travancorica	Chenkurunji.
Glyeosmis pentaphylla	..
Gmeliana arborea	Kunil.
Gmelina asiatica	..
Grewia asiatica	..
Grewia tilaefolia	Thadasu, Unnumaram.
Gymnosperica montana	..
Gyrocarpus americanus	Thanuku.
Hardwickia binata	Acha.
Hardwickia pinnata	Kulavu.
Helicteres isora	Valampiri.
Hemidesmus Indicus	Nannari.
Heritiera papilio	Sadanangu.
Hiptaga madablota	Karippaku-kodi.
Holarrhena antidysenterica	..
Holigarna arnottiana	Karunkarai, Aluvupalai.
Holoptelea integrifolia	Ayli.
Hopea parviflora	Irumbagam, Kongu.
Hugonia mystax	Kodivirai.
Hydnocarpus alpina	Maravetti, Koranguthalayar.
Hydnocarpus wightiana	Do.

APPENDIX XVIII—*cont.*

(*A*) *Common flora in the division*—cont.

Botanical name.	*Tamil name.*
Hymenodictyon execlsum	Naikadumbu.
Ixora parviflora	..
Jatropha glandulifera	Adalai.
Jatropha curcas	Kattuamanak.
Kydia calycina	..
Lannea grandis	Odiyamaram.
Lantana camara	Lantana.
Laportea crenulata	Ottupila.
Lawsonia alba	Maruthani.
Leea sambucina	..
Leucas aspera	Thumbai.
Limonia acidissima	Kattu elimichi.
Lansium anamalayanum	..
Litsaea zeylanica	..
Litsaea wightiana	..
Loranthus spp.	இரல்லி
Maba buxifolia	..
Macaranga roxburghii	Vattakanni.
Mallotus philippinesis	Makala.
Macaranga indica	Vattakanni.
Mangiferra indica	Mamaram.
Melia dubia	Malavembur.
Memcylon edule	Kaya.
Mesua ferrea	Nangu.
Miliusa velutina	....
Mimusops hexandra	....
Mimosa rubicaulis	....
Morinda tictoria	Manjanathi.
Moringa pterygosperma	Murungai.
Mundulea suberosa	Pullavaram.
Murraya exotica	Kariveppilai.
Musa spp.	Valai.
Myristica attenusta	Jathikai.
Myristica beadomei	Kattu-Jathikkai.
Myristica malabarica	....
Mimosa pudica	Thottachurungi.
Nephlium longana	Kattupoovam, Cholaipoovam.
Ochlandra brandisii	Etha.
Ochlandra rheedii	Do.
Ochlandra travancorica	Do.
Opuntia dillenii	Chappathikalli.
Palaquium ellipticum	Palodi.
Pandanus tectorius	Thalai.
Pavetta indica	Pavettai.
Pheenix acaulis	Icham.
Pinanga dicksonii	Kattu-kamugu.
Piper nigrum	Milagu.
Pithecolobium dulce	Kodukapulli.
Podocarpus latifolia	Narambili.
Poeciloneuron pauciflorum	Puthangali.
Poinciana elata	Vathamadakki.
Polyalthia coffeoides	
Polvalthia franrans	Nedunar.
Pongamia glabra	Pongam.
Protium caudatum	Kiluvai.
Pterocarpus marsupium	Vengai.
Pterolobium indicum	..
Pterospermum rubiginosum	..
Pygeum wightianum	Attainari kongu .
Randia dumatorum	Karai.
Sarcostemma brevistigma	Kodikalli.
Schleichera trijuga	Poovathi, Poovan.
Scolopia crenata	Charalu.
Semecarpus amacardium	Senkottai.
Santalum album	Santhanam.
Sapindus emarginatus	Neikottan.
Solanum pubescens	Sundaikai.
Solanum verbascifolium	..
Saptholobus roxburghii	Kattuavarai kodi.
Spondias mangifera	Mampulichi.
Stephcgyne parvifolia	Nirakadambu.
Sterculia colorata	....

APPENDIX XVIII—*cont.*

(*A*) *Common flora in the division*—cont.

Botanical name.	*Tamil name.*
Sterculia urens	Kavalam.
Stereospermum chelonoides	Poompathiri.
Stereospermum suaveolens	Pathiri.
Streblus asper	Kuttipila.
Strobilanthus spp.	Kurinji.
Strychnos nuxvomica	Ettimaram.
Strychnos potatorum	Do.
Swietenia macrophylla	Mahogany.
Swietenia mahogani	Do.
Tamarindus indica	Pulia.
Tectona grandis	Thekku.
Terminalia arjuna	Vellamaruthu.
Terminalia bellerica	Thani.
Teminalia chebula	Kadukkai.
Terminalia paniculata	Pillai marudu.
Terrameles nudiflora	Cheeni.
Tabernaemontana heyneana	..
Toddalia asiatica	Milagaranai.
Trema orientalis	Ambarathi.
Trewia nudiflora	Annathuvarai.
Tribulus terrestris	Nerinjimul.
Vateria indica	Vellaikundrikam.
Ventilago maderaspatna	Vembadam.
Vermonia monosis	Shuthi.
Vernonia travancorica	Thenpu.
Vitex altissima	Myiladi.
Vitex negundo	Nochi.
Webera corymbosa	..
Wrightia tinctorla	Palāi.
Zingiber officinale	Inji.
Zizyphus jujuba	Illandai
Zizyphus oenoplia	Pulachi.
Zizyphus trinervia	Kottai-ilandai.
Zizyphus xylopyus	Do.

(*B*). *Common names of the flora.*

Botanical name.	*Tamil name.*
Hardwickia binata	Acha.
Jatropha glandulifera	Adalai.
Artocarpus hirsuta	Aini.
Ficus bengalensis	Alamaram.
Alangium lamarckii	Alingi.
Bauhinia racemosa	Athi.
Careya arborea	Ayma.
Cassia auriculata	Avaram.
Ficus glomerata	Aththi.
Holoptlia integrifolia	Ayili.
Trema orientalis	Ambarathi.
Trewia nudiflora	Annathuvarai.
Arenga wightii	Alampanei.
Dyospyros melanoxylon	Beedi ilai.
Opuntia dillenii	Chappathikalli.
Scolopia crenata	Charalu.
Dyospyros microphylla	Chinnathovarai.
Acalypha fruiticosa	Chinni.
Calophyllum trapezifolium	Chirupunnai.
Erythroxylon monogynnm	Chenipulichi.
Terameles nudiflora	Cheeni.
Gluta travancorica	Chenkurinji.
Aglaia roxburghiana	Chokkala.
Bischofia javanica	Cholavengai.
Elettaria cardamomum	Elam.
Alstonia scholaris	Elilaipalai.
Calotropis gigantea	Erukkalai.
Strychnos sp.	Ettimaram.
Ochlandra sp.	Etha.
Zingiber officinale	Inji.
Phoenin acaulis	Icham.
Hopea parviflora	Irumbagam.
Filicium decipiens	Iruvillipalai.
Myristica attenuata	Jathikkai.
Terminalia chebula	Kadukkai.

Common names of the flora—cont.

Botanical name.	*Tamil name.*
Acacia latronum	Kakaodai.
Careva aeborea	Kalkambi.
Caesalpinia bonducella	Kalachi.
Bentinckia coddapanna	Kandapanai.
Atalantia monophylla	Kattu elumichi.
Limonia acidissima	Do.
Jatropha carcas	Kattuamanack.
Myristica beddomei	Kattujathikkai.
Pinanga dicksonii	Kattukamugu.
Nephelium longanum	Kattupoovan.
Curcuma angustifolia	Kattukoovai.
Bombax malabaricum	Kattuilavam.
Bombax insigne	Do.
Spatholobus roxburghi	Kattuavaraikodi.
Sterculia urens	Kavolam.
Randia dumetorum	Karai.
Murraya exotica	Karuveppilai.
Mallotus philippinensis	Kamala.
Hiptaae madablota	Karipakkukodi.
Gloriosa superba	Kalappai kilangu.
Euphorbia antiq-uorum	Kalli.
Elaeocarpus serratus	Karai.
Diospyros bourdilloni	Karunthovarai.
Canarium strictum	Karumkunthirigam.
Balanocarpus utilis	Karunkongu.
Gardenia gunmifera	Kambili.
Holigarna arnottiana	Karunkarai.
Acacia sundra	Karungali.
Albizzia odoratissima	Karuvagai.
Amoora canarana	Karagil.
Anacolosa densiflora	Kalmanikkam.
Memecylon edule	Kaya.
Protium caudatum	Kiluvai.
Gmelina arborea	Kumil.
Elaeodendron glaucum	Keeri.
Carissa carandas	Kilakkai.
Cassia fistula	Konnai.
Cycas circinalis	Kodi-icham.
Euphorbia tirucalli	Kodikalli.
Sarcostemma brevistigma	Do.
Hopea parviflora	Kongu.
Hugonia mystax	Kodivirai.
Pithecolobium dulce	Kodukapulli.
Zizyphus trinervia	Kottai ilandai.
Zizyphus xylopyrus	Do.
Hardwickia pinnata	Kulavu.
Caryota urens	Kundalpanai.
Abrus precatorius	Kundumani.
Streblus asper	Kuttipila.
Strobilanthus sp.	Kurinji.
Lantana camera	Lantana.
Cinnamomum sp.	Lavangam.
Swietenia sp.	Mahogany.
Garcinia morella	Makki.
Melia dubia	Malavembu.
Acrocarpus fraxinifolius	Malankonnai.
Bischofia javanica	Milachadayan.
Chickrassia tabularis	Malaivembur.
Garcinia echinocarpa	Malampunna.
Spondias mangefera	Mampulichi.
Mangifera indica	Mamaram.
Morinda tinctoria	Manjanathi.
Adina cordifolia	Manjalkadamba.
Curcuma sp.	Manjal.
Hydnocarpus alpina	Maravetti.
Lawsonia alba	Maruthani.
Agrostistachys longifolia	Manikulikki.
Antiaris toxicaria	Marauri.
Toddalia asiatica	Milagaranai.
Piper sp.	Milagu.
Bambusa arundinacea	Moongil.
Balsamodendron berryi	Mulkiluvai.
Bridelia retusa	Mulveengai.

Common names of the flora—cont.

Botanical name.	*Tamil name.*
Moringa pterygosperma	Murungai.
Vitex altissima	Myiladi.
Hymenodictyon excelsum	Maikadambu.
Dillenia pentagyna	Naitheku.
Achyranthus aspera	Naiuruvi.
Mesua ferrea	Nangu.
Hemidesmus indicus	Nannari.
Podocarpus latifolia	Narambili.
Tribulus terrestris	Naringimul.
Eugenia gardneri	Naval.
Eugenia jambolana	Do.
Eugenia ramavarma	Do.
Canthium didymum	Navugu.
Polyalthia fragrans	Nedunar.
Sapindus emarginatus	Neikottan.
Emblica officinalis	Nellikai.
Filicium decipiens	Ningal or Irugillipalai.
Stephegyne parvifolia	Nirkadambu.
Vitex negundo	Nochi.
Acacia planifrons	Odai.
Cleistanthus collinus	Odugu.
Lannea grandis	Odiyamaram.
Laoprtea crenulata	Ottapla.
Dalbergia paniculata	Paingannai.
Wrightia tinctoria	Palai.
Palaquium ellipticum	Palodi.
Borassus flabellifer	Panai.
Stereospermum suaveolens	Pathiri.
Elaeocarpus tuberculatus	Pathrach.
Pavetta indica	Pavettai.
Ailanthus excelsa	Peenari.
Ficus hispida	Peiathi.
Albizzia stipulata	Pilivagai.
Artocarpus integrifolia	Pilaw.
Terminalia paniculata	Pillamaruthu.
Calamus pseudotenuis	Pirambu.
Calamus travancoricus	Do.
Cissus quadrangularis	Pirandai.
Pongamia glabra	Pongam.
Sterospermum chelonoides	Poompathiri.
Schleichera trijuga	Poovathi.
Chloroxylon swietenia	Porasu, Vaimaram.
Tamarindus indica	Puli.
Zizyphus oenoplia	Pulichi.
Mundulea suberosa	Pullavaram.
Calophyllum inophyllum	Punnai.
Poeciloneuron pauciflorum	Puthangali.
Agave americana	Railkathalai.
Heritiera papilio	Sandanangu.
Santalum album	Santhanam.
Cedrela toona	Santhanavembu.
Buchanania latifolia	Saraiparuppu.
Semecarpus anacardium	Senkottai.
Acacia concinna	Seyakai.
Vermonia monosis	Shuthi.
Acacia ferruginea	Simavelvel.
Carissa spinarum	Sirukila.
Solanum pubescens	Sundaikai.
Grewia tiliaefolia	Thadasu.
Pandanus tectorius	Thalai.
Actinodaphne hookeri	Thali.
Gyrocarpus americanus	Thanakku.
Terminalia bellerica	Thani.
Asparagus racemosus	Thanuttukodi.
Tectona grandis	Thekku.
Entada scandens	Thellukai.
Entada scandens	Thelukkai.
Veronia travancorica	Thenpu.
Baccaurea courtellensis	Thondi.
Capparis grandiflora	Thorattai.
Capparis aphylla	Do.
Dalbergia latifolia	Thothagathi.
Mimosa pudica	Thotta churingi.

Common names of the flora—cont.

Botanical.	*Tamil name.*
Leucas aspera	Thumbai.
Albizzia amara	Usil.
Albizzia lebbeck	Vagai.
Musa superba	Valai.
Helicteres isora	Valampiri.
Givotia rottleriformis	Vandalai.
Poinciana elata	Vathamadakki.
Clerodendron infortunatum	Vattakanni.
Macaranga roxburghii	Do.
Macaranga indica	Do.
Dichrostachys cinerea	Vedathalai.
Cullenia excelsa	Vedipila.
Anogeissus latifolia	Vekkali.
Acacia pennata	Vellai Indu.
Vateria indica	Vellai kundrikam.
Dysoxylum malabaricum	Vellagil.
Terminalia arjuna	Vellamaruthu.
Bauhinia malabarica	Vellathi.
Albizzia procera	Velvagai.
Acacia leucophloea	Velvelam.
Ventilago madaraspatana	Vembadam.
Azadirachta indica	Vembu.
Pterocarpus marsupium	Vengai.
Fluggea leucopyrus	Veppula.
Feronia elephantum	Vilam.
Aegle marmelos	Vilvam.
Dodonea viscosa	Virali.
Dalbergia multiflora	Viruvetti.
Cordia myxa	Viruvu.

APPENDIX XIX.

Extract from revised all-India teak yield tables.

Quality class.	I			I/II.			II.			II/III.			III.			III/IV.			IV.		
Age.	Av.D.B.H.	Av.Ht.	Number.	Av.D.B.H.	Av.Ht.	Number.	Av.D.B.H.	Av.Ht.	Number.	Av.D.B.H.	Av.Ht.	Number.	Av.D.B.H.	Av.Ht.	Number.	Av.D.B.H.	Av.Ht.	Number.	Av.D.B.H.	Av.Ht.	Number.
C. Grade—per cent.																					
5	3·2	34	371	2·9	30	614	2·7	26	668	2·5	22	730	2·2	18	886	..	..	..	..	..	..
10	5·7	53	277	5·1	47	304	4·6	41	336	4·0	35	395	3·4	29	494	2·9	23	647	2·3	17	972
15	7·9	66	166	7·1	59	185	6.3	52	213	5·4	45	264	4·6	37	328	3·8	30	449	2·9	22	723
20	10·0	76	114	8·9	68	131	7·8	60	156	6·7	51	192	5·7	43	248	4·6	35	345	3·5	27	552
25	12·1	84	85	10·0	75	97	9·4	66	118	8·1	57	144	6·7	49	191	5·4	40	271	4·0	31	454
30	14·1	91	68	12·5	81	79	10·9	72	95	9·3	62	118	7·7	53	155	6·1	44	226	4·5	34	377
35	15·9	97	58	14·0	87	67	12·2	77	81	10·5	67	99	8·6	57	132	6·8	48	191	5·0	38	319
40	17·7	102	50	15·6	92	58	13·6	82	69	11·6	71	86	9·6	61	112	7·5	51	165	5·5	41	272
D. Grade—80 per cent.																					
5	3·3	34	455	3·0	30	470	2·7	26	500	2·5	22	560	2·2	19	689	..	..	..	..	..	..
10	8·8	52	216	5.2	46	230	4·6	41	261	4·1	35	299	3·5	30	387	2·9	24	525	2·3	18	785
15	8·3	66	125	7·4	59	137	6·5	52	158	5·6	45	193	4·7	38	253	3·8	31	358	2·9	24	573
20	10·7	76	85	9·5	68	94	8·3	60	111	7·1	52	137	5·9	44	181	4·7	36	363	3·5	28	436
25	13·0	84	63	11·5	75	71	10·0	67	85	8·5	58	105	7·0	49	142	5·6	41	201	4·1	32	340
30	15·2	92	50	13·4	82	57	11·7	73	67	9·9	64	84	8·1	55	114	6·4	45	165	4·7	36	274
35	17·1	97	43	15·1	88	48	13·1	78	58	11·1	68	72	9·1	59	96	7·1	50	141	5·3	40	226
40	18·9	102	37	16·6	92	42	14·4	88	50	12·2	72	63	10·1	63	81	7·9	53	120	5·8	43	196

APPENDIX XX.

List of grazing blocks in Shencottah taluk.

Village limits. (1)	*Survey number.* (2)	*Area in acres.* (3)
Aiyikudi	83/1	9·50
Do.	84/1	194·54
Do.	85/1	24·87
Do.	191/1	219·49
Do.	150/1	32·60
Do.	180/1	43·47
Do.	184/1	60·66
Do.	367/IA	31·14
Do.	367/IG	2·04
Do.	496/1	29·90
Do.	517/1	26·00
Do.	518/1	1·49

The above bits of land were at one time under the Forest Department when Shencottah taluk was in Kerala State. But in course of time these grazing blocks were ignored and the department ceased to exercise any control over them. The Achenpudur grazing block of 500 acres shown in official records is a portion of the lands mentioned in the above table. These lands are of no use to the department now and the Forest Department has no control over them. These may be deleted out of Forest Department books.

PROCEEDINGS OF THE CHIEF CONSERVATOR OF FORESTS, MADRAS.

Proceedings Mis. No. 41/61, 7th March 1961

Working Plan—Tirunelveli North Division—Sanctioned.

SRI C. A. R. BHADRAN, I.F.S.
Chief Conservator of Forests.

Proceedings.—Mis. No. 41/61, dated 7th March 1961.

Sanctioned.

C. A. R. BHADRAN,
Chief Conservator of Forests.

To the Conservator of Forests, Madurai Circle.
Copy to the District Forest Officer, Tirunelveli North Division.

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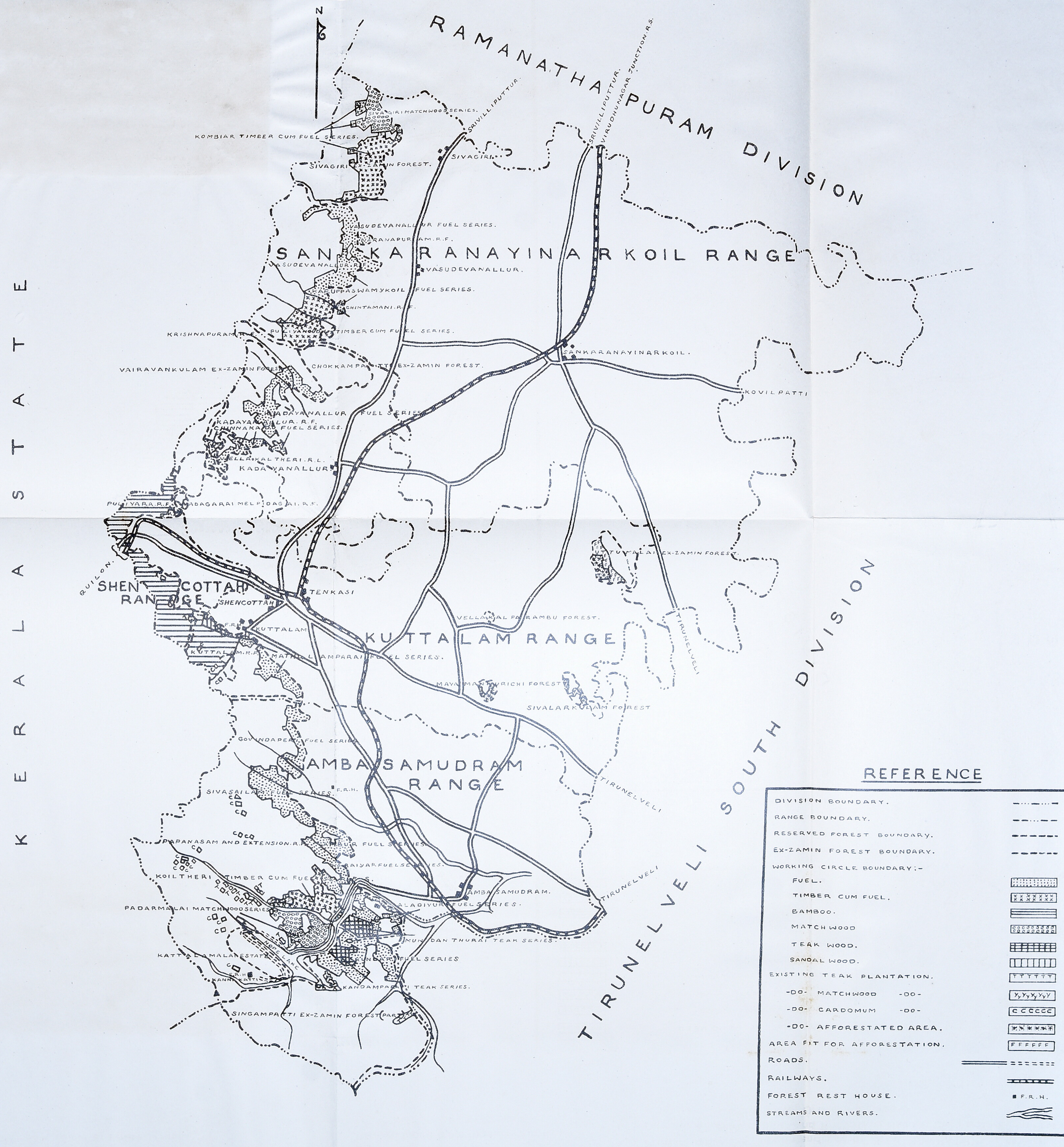
TIRUNELVELI NORTH DIVISION

KEY MAP

Scale 1 Inch = 4 Miles

TIRUNELVELI NORTH DIVISION
KEY MAP

Scale 1" = 4 Miles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RAMANATHAPURAM DIVISION
SRIVILLIPUTTUR.
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VIRUDHUNAGAR JUNCTION R.S.
SIVAGIRI MATCHWOOD SERIES.
KOMBIAR TIMBER CUM FUEL SERIES.
SIVAGIRI ZAMIN FOREST.
SIVAGIRI.
VASUDEVANALLUR FUEL SERIES.
NARANAPURAM R.F.
SANKARANAYINARKOIL RANGE
VASUDEVANALLUR R.F.
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SANKARANAYINARKOIL.
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CHOKKAMPATTI EX-ZAMIN FOREST.
KOVILPATTI
KADAYANALLUR FUEL SERIES.
KADAYANALLUR R.F.
CHINNAKAD FUEL SERIES.
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KADAYANALLUR
PULIYARA R.F.
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URUMALAI EX-ZAMIN FOREST.
KERALA STATE
QUILON.
SHENCOTTAH RANGE
SHENCOTTAH
TENKASI
F.R.H.
KUTTALAM
VELLAMALPARAMBU FOREST.
KUTTALAM RANGE
TIRUNELVELI
KUTTALAM R.F.
MATHALAMPARAI FUEL SERIES.
MAYAMANKURICHI FOREST
SIVALARKULAM FOREST
TIRUNELVELI SOUTH DIVISION
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SIVASAILAM FUEL SERIES.
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FUEL SERIES.
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PADARMALAI MATCHWOOD SERIES.
AMBASAMUDRAM.
TIRUNELVELI
ALADIYUR FUEL SERIES.
MUNDANTHURAI TEAK SERIES.
KATTALAMALAI ESTATE
FUEL SERIES
F.R.H.
KANNIKATTI
KANDAMPATTI TEAK SERIES.
SINGAMPATTI EX-ZAMIN FOREST PART
REFERENCE
DIVISION BOUNDARY.
RANGE BOUNDARY.
RESERVED FOREST BOUNDARY.
EX-ZAMIN FOREST BOUNDARY.
WORKING CIRCLE BOUNDARY:-
FUEL.
TIMBER CUM FUEL.
BAMBOO.
MATCHWOOD
TEAK WOOD.
SANDAL WOOD.
EXISTING TEAK PLANTATION.
-DO- MATCHWOOD -DO-
-DO- CARDOMUM -DO-
-DO- AFFORESTATED AREA.
AREA FIT FOR AFFORESTATION.
ROADS.
RAILWAYS.
FOREST REST HOUSE. ■ F.R.H.
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BY: S.G. SAMY.
DRAUGHTSMAN.

29/6/62
For Chief Conservator of Forests
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